

PROCEEDINGS
OF THE
ZOOLOGICAL SOCIETY OF LONDON.

January 12, 1858.

Dr. Gray, F.R.S., V.P., in the Chair.

The following papers were read :—

1. NOTES ON CALIFORNIAN BIRDS. BY THOMAS BRIDGES, CORRESPONDING MEMBER. COMMUNICATED, WITH REMARKS, BY PHILIP LUTLEY SCLATER.

(Aves, Pl. CXXXI.)

Mr. Bridges has lately forwarded to Mr. Cuming specimens of the following eleven species of birds, with the accompanying notes. I have affixed to them what I believe to be their proper names, and have given a new appellation to a Woodpecker, which appears to have been hitherto unnoticed. Mr. Bridges's second collection was unfortunately lost in the "Central America." Of the first I gave some account in these 'Proceedings' for last year (P. Z. S. 1857, p. 125).

1. *ASTUR ATRICAPILLUS* (Wilson), juv.

Shot in Trinity Valley, Northern California.

2. *TETRAO ONSCURUS*, Say? ♀.

This species is found ranging along the Sierra Nevada, at an elevation of 4000 to 6000 feet, in the Pine Forests. The specimen now forwarded was taken on Trinity Mountains, N. California. I have also seen the same bird in the Tosemite Valley, near the head waters of the Merced River, Mariposa County. Compare this with

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Tetrao obscurus; I am almost inclined to believe it differs from that species.

(I must see males of this species before I can consider it different from *T. obscurus*.—P. L. S.)

3. *CALLIPEPLA PICTA* (Douglas).

Found in flocks in the Sierra Nevada near Shasta.

4. *DRYOCOPUS PILEATUS* (Linn.).

I have only seen this fine species of Woodpecker in the Pine Forests of the Sierra Nevada, at an elevation of 4000 feet, and there it is somewhat rare, and difficult to capture. The present specimens were taken on Scott's Mountains, Trinity County, in October.

5. *MELANERPES TORQUATUS* (Wils.), ♀ juv.

This bird I first saw in Scott's Valley, on the *Pinus Benthiana*. Like the *Melanerpes formicivorus* they live in small communities, as I saw three pairs together in the above locality. In winter they migrate towards the oak-groves at the base of the Sierra Nevada, seeking a milder climate than the snow-covered pine regions.

6. *MELANERPES RUBRIGULARIS*, Sclater, sp. nov. (Pl. CXXXI.)

Supra nitenti-niger: linea circumnuchali ab oculis incipiente, altera utrinque suboculari a rictu latiore, tectricibus alarum superioribus, dorso postico et caudæ tectricibus superioribus, necnon maculis secundariorum trium extimarum apicalibus et in pogonio externo primariorum tertiæ, quartæ et quintæ albis: subtus nitenti-niger, gula media ruberrima, abdomine medio flavicante, lateribus et crisso albo nigroque variegatis; tectricibus alarum inferioribus et remigum pogonio interiore cinerascenti-nigris, maculis quadratis numerosis albis: caudæ rectricibus omnino nigris: rostro et pedibus nigris.

Long. tota 8·5, alæ 5·4, caudæ 3·5, rostri a fronte 1·0, tarsi 0·8.

(This Woodpecker, which is represented by Mr. Bridges as very rare, appears to have escaped the researches of the American naturalists; at least I am acquainted with no record of its existence, though it may have been described quite lately. It appears to be well placed in the genus *Melanerpes*, of which no less than six species are already known to inhabit California, namely *M. erythrocephalus*, *M. torquatus*, *M. thyroideus* (Cassin, B. Cal. pl. 32: *Picus natalie*, Malherbe, Cab. Journ. f. Orn., 1854, p. 271), *M. formicivorus* (Cassin, B. Cal. pl. 2), *M. albolarvatus*, and *M. ruber*. From all these it is quite different in colouring, and may be recognized at once by its black breast and bright scarlet throat-mark, whence I have named it *M. rubrigularis*.—P. L. S.)

A very rare bird, the only one of the species I have ever seen. Shot in Trinity Valley, on the pines. Probably this may occur more frequently in Oregon or the British possessions. Had it been common, I should have seen it in the southern part of the State of California.



1 Neptis Pata Moore 2 N Antara Moore 3 N Narayana Moore 4 N Amba Moore
 5 N Columella ♂♀ Cram 6 N Soma 7 N Ida Moore 8 N Dhryodana Moore



1. *Athyna Subrata* ♀ Moore 2. *A. Karwa* Moore 3. *A. Idita* Moore 4. *A. Illigera* Esch
 5. *A. Dana* Moore 6. *A. Kona* ♀ A. *Gutama* Moore

7. *MELANERPES ALBOLARYATUS*.—*Leuconerpes albolarvatus*, Cassin, Pr. Ac. Sc. Phil. 1850, p. 106; Journ. Ac. Phil. n. s. iii. p. 257. pl. 22, ♂ et ♀.

This is not uncommon in the Trinity Valley, seeking its food on the tall pines. The male is easily distinguished from the female by the red band of feathers at the base of the cranium.

(Better placed in the genus *Melanerpes* than with *Leuconerpes*.—P. L. S.)

8. *PICUS HARRISI* (Aud.).

Shot near Shasta, base of the Sierra Nevada.

9. *PICUS NUTTALLI*, Gambel.

Taken on the mountains near Shasta in September.

10. *TURDUS NÆVIUS* (Gm.), Bp. Consp. p. 271.

This pretty species of Thrush is very rare in California, as I have only seen two specimens. These I observed in the coast range of mountains west of Santa Clara. It inhabits the evergreen oak-groves, *Quercus densifolia*. Taken in October (female).

11. *CINCLUS AMERICANUS*, Sw.

I have only seen this remarkable bird in the head waters of Trinity and Scott's Rivers at California. It is constantly seeking its food amongst the boulder rocks in the rivers, or on the shallows amongst pebbles; sometimes wading, diving or swimming, and at other times flying from rock to rock. I have often watched them, and always felt a sort of amusement at their restless and singular movements.

San Francisco, Nov. 18th, 1857.

2. MONOGRAPH OF THE ASIATIC SPECIES OF *NEPTIS* AND *ATHYMA*, TWO GENERA OF DIURNAL LEPIDOPTERA BELONGING TO THE FAMILY NYMPHALIDE. BY FREDERIC MOORE, ASSISTANT, MUSEUM EAST INDIA COMPANY.

(Annulosa, Pl. XLIX.—LI.)

The following monograph contains descriptions of all the species of the genera *Neptis* and *Athyma* that I have been enabled to bring together from the various collections in this country.

Genus *NEPTIS*, Fabricius.

Neptis, Fabricius, Syst. Gloss. (Illiger's Mag. vi. p. 282, 1808); Horsfield; Westwood.

Acca, p., Hübner, Verz. bek. Schmett (1816).

Limentis, p., Boisduval, Ind. Meth. Eur. Lep. p. 16 (1840); E. Doubleday.

1. NEPTIS HORDONIA.

Papilio Hordonia, Stoll, Suppl. Cramer, Pap. Exot. i. t. 33. f. 4, 4. D. (1791).

Nymphalis Hordonia, Godart, Enc. Méth. ix. p. 429.

Limenitis Hordonia, E. Doubleday, List Lep. Brit. Mus. pt. 1. p. 93.

Neptis Hordonia, Westwood in Doubleday & Hewitson's Diurnal Lep. p. 271. n. 3; Moore, Catal. Lep. Mus. E. I. C. i. p. 164.

Hab. Silhet; Darjeeling; N. India; Ceylon; Java. In most collections.

Remark.—*Neptis Hordonia* may be known by the mottled markings of the under-side.

2. NEPTIS PATA, Moore. (Pl. XLIX. f. 1.)

Neptis Pata, n. sp.—Upper-side brown-black; markings ferruginous, these being disposed as in *Neptis Hordonia*. May be distinguished from that species by the under-side being black, and without any mottled markings.

Hab. Manilla. In the collection of W. W. Saunders, Esq.

3. NEPTIS TIGA, Moore.

Papilio Heliodore, Fabricius, Ent. Syst. iii. pt. 1. p. 130 (1793); Jones, Icon. iv. t. 76. f. 2 (nec Cramer, 1782).

Nymphalis Heliodore, Godart, Enc. Méth. ix. p. 429.

Limenitis Heliodore, E. Doubleday, List Lep. Brit. Mus. pt. 1. p. 93.

Neptis Heliodore, Westwood in Doubleday & Hewitson's Diurnal Lep. p. 271. n. 4; Moore, Catal. Lep. Mus. E. I. C. p. 164.

Hab. Java; Borneo. In Museum East India Company; British Museum, W. W. Saunders, Esq.

Remark.—*Neptis Tiga* may be distinguished from the two preceding by the well-defined markings of the under-side.

4. NEPTIS ANTARA, Moore. (Pl. XLIX. f. 2.)

Neptis Antara, n. sp. Male.—Upper-side dusky-brown; forewing with discoidal streaks, curved interrupted band from costal margin near the apex to middle of posterior margin, and narrow submarginal wavy line, deep ferruginous; indistinct marginal and narrow border to submarginal line, blackish; hind-wing with straight inner and curved narrower outer band deep ferruginous; indistinct marginal and submarginal line, and inward borders to the two bands blackish. Under-side very pale, markings as above, but all having black borders. Expanse nearly 2 inches.

Hab. Celebes. In British Museum Collection.

5. NEPTIS MIAH, Moore.

Neptis Miah, Moore, Catal. Lep. Mus. E. I. C. i. p. 164. pl. a. f. 1 (1857).

Neptis Miah.—Upper-side brown-black; fore-wing with a longitudinal streak from base of wing, an oblique transverse short apical fascia, which nearly meets a reversely oblique fascia on posterior margin, rufous; hind-wing with a nearly straight broad inner band and a narrow submarginal band rufous. Under-side dark ferruginous; fore-wing with the longitudinal and oblique marks pinky-white; two narrow submarginal lines purple; hind-wing with inner band pinky-white; two submarginal and a less distinct middle line purple; costal margin at the base whitish. Expanse $2\frac{2}{5}$ inches.

Hab. Darjeeling; N. India. In Museum East India Company, and W. W. Saunders, Esq.

Remark.—Allied to the two preceding species, but may be distinguished by the colour and markings of the under-side.

6. NEPTIS MANASA, Moore.

Neptis Manasa, Moore, Catal. Lep. Mus. E. I. C. i. p. 165, pl. 4 a. f. 2 (1857).

Neptis Manasa. Male.—Upper-side dull dusky-brown; markings white, tinged with very pale ferruginous; fore-wing with the discoidal streak long, and continued in a curve to near the posterior angle; an apical oblique streak; two small spots on costal margin, and one below the margin; a spot on middle of posterior margin; a marginal row of small indistinct spots; hind-wing with broad inner and narrower outer band, both extending across the abdominal margin; an indistinct marginal line and line between the two bands; narrow cilia white. Under-side pale ochreous, with indistinctly-defined white markings; the discoidal streak is continued uninterrupted to the middle of the posterior margin, the space within being blackish; on the hind margin are some small white markings between the inner band and costal vein. Expanse $2\frac{1}{2}$ inches.

Hab. N. India. In Museum East India Company.

Remark.—*Neptis Manasa* may be distinguished above by the discoidal streak being nearly confluent with the spot on the middle of the posterior margin, it being quite confluent on the under-side.

7. NEPTIS ANANTA, Moore.

Neptis Ananta, Moore, Catal. Lep. Mus. E. I. C. i. p. 166, pl. 4 a. f. 3 (1857).

Neptis Ananta. Male.—Upper-side brownish-black; markings ferruginous; fore-wing with discoidal streak straight; a curved twice-interrupted band from anterior margin near apex to middle of posterior margin; a pale marginal line; hind-wing with rather broad inner and narrow outer band, both extending across the abdominal margin; also a pale marginal line and line between the bands. Under-side very deep ferruginous; fore-wing with discoidal streak, spots near apex and from posterior margin, ferruginous-white; posterior margin broadly patched with black; a marginal and submarginal bluish-ashy line; hind-wing with inner band white, outer band

grey and indistinct; a marginal line and zigzag line between the two bands bluish-ashy. Expanse $2\frac{1}{2}$ inches.

Hab. Simla; N.W. India. In Museum East India Company, and W. C. Hewitson, Esq.

Remark.—This species may be known from *N. Manasa* by its ferruginous markings and straight discoidal streak.

8. NEPTIS NARAYANA, Moore. (Pl. XLIX. f. 3.)

Neptis Narayana, n. sp. Male.—Upper-side black; markings white; fore-wing with the discoidal streak narrow; along costal margin towards the apex some narrow spots, with two large spots descending obliquely across the apex; a quadrate spot in middle of disc, and another on posterior margin; two submarginal narrow spots parallel with the quadrate discal spot; hind-wing with straight inner and narrower nearly straight outer band. Under-side glossy ferruginous, darkest about the middle of the wings, very pale at the base of costal margin, and blackish along posterior margin of the fore-wing; fore-wing with markings as above; hind-wing with submarginal line, zigzag line between the two bands, greyish-white. Expanse $2\frac{2}{3}$ inches.

Hab. N. India. In British Museum Collection.

Remark.—Allied to *Neptis Zaida*, but may be known from that and other allied species by the markings on the upper-side being pure white.

9. NEPTIS RADHA, Moore.

Neptis Radha, Moore, Catal. Lep. Mus. E. I. C. i. p. 166. pl. 4 a. f. 4 (1857).

Neptis Radha. Male.—Upper-side brownish-black; markings ferruginous; fore-wing with a long discoidal streak, narrow at base, and extending to a short distance between the third and second median veinlets; two small spots on costal margin, and two larger oblique spots near the apex; a large spot on disc, and an elongate spot to middle of posterior margin; marginal line pale; hind-wing with rather broad inner and narrower outer band, both extending across the abdominal margin; a marginal line and line between the two bands pale brown. Under-side ferruginous-brown; markings as above, but indistinct, owing to the surface being mottled over with ashy-blue. Expanse $2\frac{1}{3}$ inches.

Hab. Darjeeling; Bootan; N. India. In Museum East India Company.

10. NEPTIS ZAIDA.

♂ *Limenitis Zaida*, E. Doubleday, MS.

Neptis Zaida, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 272. n. 9. t. 35. f. 3 (1850).

Hab. Simla; N.W. India. In Collection British Museum, and W. C. Hewitson, Esq.

Remark.—*Neptis Zaida* (the male *only* of which I am acquainted with) has the wings more rounded than in the other allied species, and on the hind-wing the inner band is very broad, the outer band narrow and *much curved*.

11. NEPTIS AMBA, Moore. (Pl. XLIX. f. 4.)

Neptis Amba, n. sp. Male.—Upper-side smoky-brown; markings white; fore-wing with long discoidal streak indented at the extremity of the cell; two oblique spots near the apex, and four reversely oblique spots to middle of posterior margin; an indistinct marginal and submarginal black line; hind-wing with rather broad inner band and narrow brownish-white outer band; marginal and submarginal line darker. Under-side dark ferruginous; markings as above; but the marginal and submarginal lines, base of costal margin, and streak near base of hind-wing also white.

Hab. Nepal (*General Hardwicke*). In Collection British Museum.

12. NEPTIS VIKASI, Horsfield.

Neptis Vikasi, Horsfield, Catalogue of Lep. Mus. E. I. C. (1829) t. 5. f. 2, 2 a; Moore, Catal. Lep. Mus. E. I. C. i. p. 165.

Limenitis Vikasi, E. Doubleday, List Lep. Brit. Mus. pt. 1. p. 94.

Athyma Vikasi, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 274. n. 10.

Hab. Java; Darjeeling; N. India. In most collections.

13. NEPTIS COLUMELLA. (Pl. XLIX. f. 5.)

Papilio Columella, Cramer, Pap. Exot. iv. t. 296. f. A, B (1782).

Limenitis Columella, E. Doubleday, List Lep. Brit. Mus. pt. 1. p. 95.

Neptis Columella, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 272. n. 7; Moore, Catal. Lep. Mus. E. I. C. i. p. 166.

Acca Columena, Hübner, Verz. bek. Schmett. p. 44.

Hab. Darjeeling, N. India; China; Ceylon; and specimens from the Island of Lombok, which I have examined, are also identical. In Collection British Museum, East India Company, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

14. NEPTIS JUMBA, Moore.

Neptis Jumba, Moore, Catal. Lep. Mus. E. I. C. i. p. 167. pl. 4 a. f. 5 (1857).

Neptis Jumba. Upper-side smoky-black; fore-wing with a narrow longitudinal streak, and a parallel triangular spot, white; a transverse curved row of interrupted white spots, from apical third of costal margin to near middle of posterior margin, composed of two very narrow longitudinal spots on the costal margin, beneath which are two large spots, then a very small streak, then two large spots, and lastly two narrower spots terminating on posterior margin; between this band of spots and exterior margin are two rows of more

or less defined lunular-shaped white spots, these being bounded exteriorly by a row of deep black; hind-wing with a broad white band from costal to abdominal margin, being intersected by the veins; near outer margin a row of ill-defined white lunulated marks, bounded exteriorly by deep black, then a submarginal row of black lines; between the white band and row of lunulated white marks is a broad band of black. Under-side ferruginous; fore-wing with markings as above, but the four rows of markings along exterior margin white, and suffused at the apex and near the middle with ferruginous; hind-wing with the broad white band; abdominal margin, base of costal margin, and broadly across parallel with the band, suffused with white; a marginal and two submarginal rows of whitish marks, between which and the broad band is a series of fine dark ferruginous spots from abdominal margin, and terminating in white marks on costal margin. Body above black, beneath white. Sexes alike. Expanse $2\frac{2}{8}$ to $2\frac{1}{2}$ inches.

Hab. Darjeeling, N. India; Ceylon. In Museum East India Company, British Museum, and W. C. Hewitson, Esq.

15. NEPTIS HELIODORA.

Papilio Heliodora, Cramer, Pap. Exot. iii. t. 212. f. E, F (1782) (nec Fabr. 1793).

Acca Heliodora, Hübner, Verz. bek. Schmett. f. 44.

Nymphalis Helicopsis, Godart, Enc. Méth. ix. p. 431 (1819).

Athyma Helicopsis, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 274. n. 3.

Hab. Moluccas; Amboyna (*Cramer*).

Remark.—I have not as yet seen any example of this species. It is allied to the following.

16. NEPTIS SHEPHERDI. (Pl. L. f. 1.)

Limnitis Shepherdii, Newman, MS.—Upper-side brownish-black; fore-wing, with discoidal streak in two portions, the first being indistinct, the second a triangular spot; oblique spots from costal margin near apex, two larger spots on middle of the disc, and an elongated spot and a small dot above it on posterior margin, a submarginal row of spots and second outer very indistinct row, white; hind-wing with broad white transverse band from near middle of anterior to middle of abdominal margin; marginal lines pale brown. Under-side ferruginous-brown, suffused in parts with paler brown; fore-wing with base of costal margin yellow; markings as above, but the first portion of discoidal streak more distinct, the discal spots somewhat smaller, and between marginal row of spots and outer margin are two rows of narrow white linear marks; hind-wing with transverse white band; three and an indistinct fourth row of narrow marginal lines; base of anterior margin and below costal vein whitish. Expanse $2\frac{3}{4}$ inches.

Hab. New South Wales, Australia. In Collection British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

17. NEPTIS SOMA, Moore. (Pl. XLIX. f. 6.)

Neptis Soma, n. sp.—Allied to, but differs from, *Neptis Nandina*, on the upper-side, in having the discoidal streak narrower, and the curved row of seven spots are much smaller, being only half their size, and are wider apart; the submarginal row of spots is also smaller; the bands on hind-wing are also narrower; on the under-side the colour is of a deep maroon, the markings as in upper-side, but those on the hind-wing less straight. Sexes alike. Expanse from $2\frac{3}{8}$ to $2\frac{5}{8}$ inches.

Hab. Silhet, N. India. In Collection British Museum, and W. C. Hewitson, Esq.

18. NEPTIS NANDINA, Moore.

Neptis Nandina, Moore, Catal. Lep. Mus. E. I. C. i. p. 168. pl. 4 a. f. 7 (1857).

Neptis Nandina.—Upper-side black; markings white; fore-wing with discoidal streak in two entire portions; the curved row of seven spots broadly interrupted; and a submarginal row of small less-defined spots; hind-wing with inner band, and narrow outer row of less-defined square spots; indistinct marginal line and line between the bands brown. Under-side deep chocolate-brown, with markings as above, but more defined and of a brighter colour; those of the hind-wing rather straight, except the marginal and submarginal lines, which are gently curved. Sexes alike. Expanse $2\frac{1}{4}$ to $2\frac{5}{8}$ inches.

Hab. Darjeeling, Assam, N. India; Java. In Museum East India Company, British Museum, and W. C. Hewitson, Esq.

Remark.—This species may be known from *Neptis Aceris* by the deep chocolate colour of the under-side, by the anterior margin of hind-wing being evenly arched to beyond the middle, and by all the markings on this wing being nicely and evenly curved, more evenly than is shown in the figure.

19. NEPTIS ACERIS.

Papilio Aceris, Esper, Ausl. Schmett, t. 81. cont. 31. f. 3, 4; t. 82. f. 1 (1785); Fabricius, Mant. Ins. ii. p. 52; *id.* Ent. Syst. iii. pt. 1. p. 245.

Nymphalis Aceris, Godart, Enc. Méth. ix. p. 430.

Acca Aceris, Hübner, Verz. bek. Schmett. p. 44.

Limnitis Aceris, Boisduval, Icon. Hist. t. 18. f. 2; *id.* Ind. Méth. p. 16; E. Doubleday, List Lep. Brit. Mus. pt. 1. p. 95; Kollar in Hügel's Kaschmir, iv. pt. 11. p. 428.

Neptis Aceris, Fabricius, Syst. Gloss. (Illiger's Mag. vi. p. 282); Horsfield, Catal. Lep. Mus. E. I. C. t. 7. f. 9; Westwood in Doubleday and Hewitson's Diurnal Lep. p. 271. n. 5; Moore, Catal. Lep. Mus. E. I. C. i. p. 168.

Papilio Plantilla, Hübner, Europ. Schmett. Pap. f. 99, 100 (1805).

Acca Matuta, Hübner, Verz. bek. Schmett. p. 44 (1816).

Neptis Matuta, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 272. n. 6.

Papilio Leucothoë, Cramer, Pap. Exot. iv. t. 296. f. E, F (nec Linn.); Donovan, Ins. of China, 1st edit. t. 35. f. 3 (nec Linn.).

Limenitis Eurynome, Westwood in 2nd edit. Donovan's Ins. of China, p. 66. t. 35. f. 3.

Athyma Eurynome, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 274. n. 2.

Hab. Germany; Hungary; South Russia; North-western, North-eastern, Central, and Southern India; Ceylon; China; Madjico Sima; Pinang, Malacca, Java, Borneo, Manilla. In most collections.

Remark.—After carefully examining a number of specimens of this species from all the localities above enumerated, I am enabled to say that I can detect no difference between the alleged species *Aceris*, *Matuta*, and *Eurynome*. Specimens measuring in expanse from $1\frac{1}{2}$ to $2\frac{1}{4}$ inches are obtained from the same locality, and the Chinese specimens are generally larger, some being $2\frac{1}{2}$ inches in expanse; those from the latter locality have been named *Eurynome* by Mr. Westwood, the *type*-specimen of which I have examined.

20. NEPTIS IDA, Moore. (Pl. XLIX. f. 7.)

Neptis Ida, n. sp.—Upper-side dusky brown; fore-wing with discoidal streak, and curved series of white spots as in *Neptis Aceris*; marginal, submarginal and third inner row of small white spots; hind-wing with broad inner band, and narrower outer row of widely separated spots, white; a marginal line of narrow whitish marks; line between the two bands pale brown. Under-side pale ferruginous, markings as above, all white and broader. Expanse $2\frac{1}{2}$ inches.

Hab. Celebes or Mindanao. In the Collection of W. W. Saunders, Esq., and W. C. Hewitson, Esq.

This beautiful species was recently brought home by Madame Ida Pfeiffer.

21. NEPTIS DURYODANA, Moore. (Pl. XLIX. f. 8.)

Neptis Duryodana, n. sp.—Differs from Bornean specimens of *Nep. Aceris*, in being of a much blacker colour on the upper-side, the markings also being much whiter; and in the under-side being brown, where the inner band of the hind-wing does not extend to the inner margin as in that species, and the marginal and submarginal lines are more curved. Expanse $2\frac{1}{8}$ inches.

Hab. Borneo. In collection of British Museum, and W. C. Hewitson, Esq.

22. NEPTIS NATA, Moore.

Neptis Nata, Moore, Catal. Lep. Mus. E. I. C. i. p. 168. pl. 4 a. f. 6 (1857).

Neptis Nata.—Upper-side deep black, markings very white; fore-wing with discoidal streak long, in two portions; curved series of spots small; hind-wing with the bands narrow. Under-side dusky brown; inner band of hind-wing not extended to anterior margin;

a marginal line only between outer band and exterior margin, the submarginal line being obsolete. Sexes alike. Expanse $2\frac{2}{8}$ inches.

Hab. Singapore and Borneo. In Collection East India Company, British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

Genus *ATHYMA*, Westwood.

Athyma, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 272 (1850).

Acca, pt., Hübner, Verz. bek. Schmett.

Biblis, pt., Fabricius, Syst. Gloss.; Horsfield, Catal. Lep. Mus. E. I. C. (1829).

Limenitis, pt., E. Doubleday, List Lep. Brit. Mus.

1. *ATHYMA LEUCOTHOË*.

Papilio Leucothoë, Linnæus, Mus. Lud. Ulr. 292; *id.* Syst. Nat. ed. 12. ii. p. 780; Fabricius, Ent. Syst. iii. pt. 1. p. 129; Sulzer, Hist. Ins. t. 18. f. 2, 3.

Nymphalis Leucothoë, Godart, Enc. Meth. ix. p. 430.

Acca Leucothoë, Hübner, Verz. bek. Schmett. p. 44.

Biblis Leucothoë, Horsfield, Catal. Lep. Mus. E. I. C. t. 8. f. 3.

Limenitis Leucothoë, Westwood in Donovan's Ins. of China, 2nd edit. t. 35. f. 4; Kollar in Hügel's Kaschmir, iv. pt. 11. p. 428; E. Doubleday, List Lep. Brit. Mus. pt. 1. p. 94.

Athyma Leucothoë, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 273; Moore, Catal. Lep. Mus. E. I. C. i. p. 170.

Papilio Erosine, Cramer, Pap. Exot. iii. t. 203. f. E. F.

Najas hilaris Erosine, Hübner, Samml. Exot. Schmett. Band.

Papilio Polyxena, Donovan, Ins. of China, 1st edit. t. 35. f. 4 (1798).

Hab. N. India; China; Java; Sumatra. In most collections.

Remark.—The specimens of *Athyma Leucothoë* from Java are generally smaller than those from India, and have the central band broader and the portions closer together. Sexes alike.

2. *ATHYMA OPALINA*.

Lymenitis opalina, Kollar in Hügel's Kaschmir, iv. pt. 2. p. 427 (1844).

Athyma opalina, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 274. n. 5; Moore, Catal. Lep. Mus. E. I. C. i. p. 171. pl. 5 a. f. 2.

Hab. Darjeeling; Masuri (*Kollar and Hearsey*). In Collection East India Company, British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

Remark.—This species may be distinguished by the discoidal streak being divided into four portions, as in *Athyma Leucothoë*, and by the deep ferruginous colour of the under-side being suffused

in parts with grey and greyish brown. Expanse $2\frac{2}{8}$ to $2\frac{7}{8}$ inches. Sexes alike.

3. *ATHYMA BAHULA*, Moore. (Pl. L. f. 2.)

Athyma Bahula, n. sp. ?—Allied on the upper-side to *Athyma opalina*, and, like that species, on the fore-wing has the discoidal streak divided into four portions, but which differs in being narrow and the terminal portion being much elongated, whereas in *A. opalina* this portion is short; it has also a distinct submarginal row of linear spots; the bands are also narrower throughout; on the under-side this species differs in the fore-wing in having the portions of the discoidal streak divided by a blackish line, and a distinct marginal and submarginal row of spots; space between the markings blackish; on the hind-wing between the curved precostal streak and inner band are some short blackish lines: in *Ath. opalina*, on the inner band from the middle of its lower margin, there is a descending greyish portion to abdominal margin, whereas in *Ath. Bahula* this is wanting; space between the two bands with blackish patches; a distinct marginal row of linear spots. Expanse $2\frac{3}{8}$ to $2\frac{7}{8}$ inches. Sexes alike.

Hab. Sylhet. In British Museum Collection, and W. C. Hewitson, Esq.

4. *ATHYMA LARYMNA*.

Limenitis Larymna, E. Doubleday, MS.

Athyma Larymna, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 274. n. 7. t. 35. f. 1 (1850); Moore, Catal. Lep. Mus. E. I. C. i. p. 172.

Hab. Borneo. In Collection East India Company, British Museum, and W. W. Saunders, Esq.

Remark.—In this fine species, recently sent home by Mr. Wallace, the sexes are alike.

5. *ATHYMA RETA*, Moore. (Pl. L. f. 3.)

Athyma Reta, n. sp.—Allied to, but differs from *Ath. Kresna* in having the discoidal streak somewhat narrower, the three oblique spots near the apex and the three to the posterior margin much larger, there also being a small spot between these two series; marginal lines very indistinct; bands on the hind-wing rather broad; markings of the under-side as in above. Expanse $2\frac{3}{8}$ inches.

Hab. Sumatra (*Raffles*). In the collections of Dr. Horsfield and W. C. Hewitson, Esq.

6. *ATHYMA KRESNA*, Moore. (Pl. L. f. 4.)

Athyma Kresna, n. sp. Male.—Upper-side blackish-brown; fore-wing with discoidal streak in three portions, the third portion largest and triangular; an oblique transverse row of three spots near the apex; a large spot in middle of disc, and two smaller spots on middle of posterior margin, bluish-white; a submarginal row of

small ill-defined whitish spots; hind-wing with inner band and narrower outer row of spots, bluish-white; a narrow marginal line to both wings, light brown. Under-side brown, with markings as above, but all less defined, except the marginal line, which is whitish. Expanse $2\frac{3}{4}$. Body with collar and band across abdomen white.

Hab. Borneo; Sumatra. In Collection British Museum.

Allied to *Ath. Larymna*, Dbl., but distinguished by its smaller size and white markings, the discoidal streak in that species being in four portions.

7. ATHYMA NEFTE. (Pl. L. f. 5.)

♀ *Papilio Nefte*, Cramer, Pap. Exot. iii. t. 256. f. E. F. (1782).

Pantoporia Nefte, Hübner, Verz. bek. Schmett. p. 44.

Nymphalis Nefte, Godart, Enc. Meth. ix. p. 429.

Limenitis Nefte, Boisduval, Spec. Gen. Lep. t. 8 (4 B.). f. 6; E. Doubleday, List Lep. Brit. Mus. pt. 1. p. 93.

Athyma Nefte, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 274. n. 11; Moore, Catal. Lep. Mus. E. I. C. i. p. 173.

Hab. Java; Borneo. In Museum East India Company, British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

Remark.—The male of *Athyma Nefte* has all the markings of the upper-side white, these in the female being orange-coloured.

8. ATHYMA ASITA, Moore.

Athyma Asita, n. sp. Male.—Differs from *Ath. Inara* on the upper-side of the fore-wing in having the basal portion of the discoidal streak white; the submarginal row of spots being ferruginous at the apex of the wing only, the rest being white; and on the hind-wing in having both bands white. Under-side with markings coloured as in upper-side. Expanse $2\frac{2}{5}$ inches.

Hab. Unknown, probably N. India. In Collection of W. W. Saunders, Esq.

Remark.—This species is intermediate between *Athyma Nefte* and *Ath. Inara*. Female unknown.

9. ATHYMA INARA. (Pl. L. f. 6.)

♂ *Limenitis Inara*, E. Doubleday, MS.

♂ *Athyma Inara*, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 274. t. 34. f. 3 (1850); Moore, Catal. Lep. Mus. E. I. C. i. p. 173.

Hab. Darjeeling, N. India. In Collection East India Company, British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

Remark.—The female of *Athyma Inara* has all the markings on the upper-side orange colour, as in that sex of *Ath. Nefte*.

10. ATHYMA SUBRATA, Moore. (Pl. LI. f. 1.)

Athyma Subrata, n. sp. Female.—Upper-side deep brown, with the markings disposed as in the female of *Athyma Nefte*; but they are all narrower, and instead of being of a deep orange colour, are

suffused with very pale brown. The under-side is also much darker, being of a light smoky-brown, with all the markings white. Expanse $2\frac{1}{2}$ inches.

Hab. Malacca, Sumatra. In Collection British Museum, and W. W. Saunders, Esq.

11. *ATHYMA CAMA*, Moore.

Athyma Cama, Moore, Catal. Lep. Mus. E. I. C. i. p. 174. pl. 5 a. f. 5 ♂ ♀ (1857).

Athyma Cama. Male.—Upper-side velvety-black; fore-wing with a brown marginal and submarginal line; discoidal streak indistinct, ferruginous, and dusted over with black; near the apex a ferruginous spot; two oblique spots from subcostal vein on one-third of the wing from the apex, and a band of three spots from middle of wing to posterior margin, joining a band across the hind-wing, white, bordered with blue; on the hind-wing also a marginal and submarginal brown line. Body black, with a broad white band across base of abdomen, also a pale ferruginous line across the thorax. Under-side pale ferruginous, markings purplish-white; the curved band as above; fore-wing with a long broad irregular discoidal streak, a submarginal and indistinct marginal line; a black patch near the base of wing, and another near posterior angle; hind-wing with a curved line near base of wing, and a rather broad outer band, a marginal row of marks; some patches of brown between outer and inner band. Body and abdominal margin broadly grey.

Female.—Upper-side black; markings ferruginous; fore-wing with a long discoidal streak; an oblique band from anterior to near middle of exterior margin, and nearly joining a band running to middle of posterior margin; a marginal and submarginal brown line, the latter ferruginous anteriorly and posteriorly; hind-wing with a broad inner and narrower outer band; also a marginal brown line. Body black, with a white band across the base of abdomen, and tinged below the band with ferruginous; also a pale white collar. Under-side ferruginous; markings as in the male, but pinky-white, except marginal and submarginal lines, which are purplish-white. Expanse of wings in male $2\frac{1}{2}$ to $2\frac{2}{3}$ inches, female 3 inches.

Hab. Darjeeling, N. India. In Museum East India Company, and W. C. Hewitson, Esq.

Remark.—The male of *Athyma Cama* may at once be known from that sex of *Ath. Selenophora* in having on the upper-side a ferruginous spot close to the apex, and the band on the fore-wing being composed of three spots.

12. *ATHYMA SELENOPHORA*.

♂ *Limenitis Selenophora*, Kollar in Hügel's Kaschmir, iv. pt. 11. p. 426. t. 7. f. 1, 2 (1844); Westwood in Doubleday and Hewitson's Diurnal Lep. p. 276. n. 8.

Athyma Selenophora, Moore, Catal. Lep. Mus. E. I. C. i. p. 175.

Hab. Masuri (*Kollar*); Darjeeling. In Collection East India

Company, British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

Remark.—The male of this species may be distinguished from *Ath. Cama* on the upper-side by having the oblique subapical spots narrower, and the band on the fore-wing being composed of four spots; in the under-side being of a darker ferruginous colour, and the streak along discoidal cell being divided into four portions, and in having darker black blotches; also in having on the hind-wing four short black lines disposed between the inner band and discoidal vein. Expanse of male $2\frac{4}{5}$ inches. Female unknown, but would have the markings above ferruginous.

13. *ATHYMA RANGA*, Moore.

Athyma Ranga, Moore, Catal. Lep. Mus. E. I. C. i. p. 175. pl. 5 a. f. 6 (1857).

Athyma Ranga.—Upper-side smoky-black; fore-wing with a curved interrupted white band from anterior margin, one-third from the apex, to middle of posterior margin, being composed of eight spots, the first on anterior margin very narrow, second, third and fourth elongate conical, the fourth being the shortest; fifth triangular and broadly divided from the fourth; sixth broad, largest, and nearly square; seventh narrower and broadly divided from the sixth; and eighth long and narrow; a marginal and submarginal row of rather indistinct whitish spots; base of wing covered with indistinct white spots; hind-wing with broad inner band, intersected by the veins; an outer or submarginal row of broad conic-shaped indistinct white spots; a marginal row of very indistinct spots, also indistinct spots at the base of wing; abdominal margin whitish. Body dark brown: abdomen with two rows of small white spots. Under-side with the markings the same and very distinct; body and abdominal margin greenish-white. Expanse $2\frac{3}{4}$ inches. Sexes alike.

Hab. Darjeeling. In Museum East India Company, British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

14. *ATHYMA MAHESA*, Moore.

Athyma Mahesa, Moore, Catal. Lep. Mus. E. I. C. i. p. 176. pl. 5 a. f. 7 (1857).

Athyma Mahesa. Male.—Upper-side smoky-black; fore-wings with a green gloss in some lights; fore-wing with three white ovate spots obliquely from subcostal vein one-third from the apex; two white spots in middle of the wing, the upper one very small, and two white spots on middle of posterior margin, the upper oval, the lower narrow; two indistinct white spots in discoidal cell, and some indistinct greenish spots at the base of the wing; a marginal and submarginal row of light brown spots; hind-wing with an inner white band, divided by the veins, and an outer or submarginal row of indistinct brownish-white conic-shaped spots; also a very indistinct marginal row of small light brown spots. Body brown; abdomen

with two rows of white spots. Under side paler, tinged with ferruginous about the disc; markings the same, but all very distinct, and more or less white; the spots within discoidal cell and base of fore-wing divided by black marks; base of costal margin yellowish-white; hind-wing with space between precostal and costal vein yellowish-white; a curved oval black mark, whitish within, between the costal vein and inner band; a row of black patches between inner and outer band. Body and broadly on abdominal margin yellowish-grey. Expanse $2\frac{1}{4}$ inches.

Hab. Darjeeling. In Museum East India Company, and Hopeian Collection at Oxford.

Remark.—This species may be known from *Athyma Ranga* by its larger size and much narrower band.

15. *ATHYMA ABIASA*, Moore. (Pl. L. f. 7.)

Athyma Abiasa, n. sp. Male.—Upper-side black; markings bluish-white; fore-wing with an indistinct narrow streak from base, and a large spot near extremity of the discoidal cell; an indistinct narrow transverse disco-cellular line; three spots obliquely from subcostal vein one-third from the apex, the third spot being minute; two spots in middle of the disc, the upper one small, the lower very large, also a large spot on middle of posterior margin; also a submarginal row of very small whitish spots; hind-wing with rather broad inner band, and outer row of recurved small triangular spots; an indistinct brown marginal line. A band of white across base of abdomen. Under-side dusky-brown, marked as above, with the marginal lines plainer. Expanse 2 inches.

Hab. Java. In British Museum Collection.

16. *ATHYMA IDITA*, Moore. (Pl. LI. f. 3.)

Athyma Idita, n. sp. Male.—Upper-side blackish-brown; markings bluish-white; fore-wing with the discoidal streak in two portions, the first narrow, the second somewhat round; from subcostal vein curving to middle of posterior margin a series of seven spots, the upper two oval, rather long, the third the smallest, fourth larger, the third and fourth widely separated from second and fifth, fifth largest, nearly round, outwardly oblique, sixth and seventh irregularly shaped; a submarginal row of narrow indistinct marks, that at the posterior angle being largest; hind-wing with inner band, and narrow row of six rather square spots curving upward and outward from near abdominal angle, the last spot near anterior angle centred with a dark brown dot. Front of thorax beautifully variegated with ferruginous, green, brown and blue; base of abdomen with broad bluish-white band. Under-side very deep ferruginous; fore-wing having the discoidal streak with black transverse margins and an ill-defined third portion: curved row of spots as above; a submarginal row of large white, black-centred spots; a submarginal and marginal line of white marks; some dusky patches along posterior margin; the large portion of the discoidal streak and submarginal row

of spots with purple reflexions; hind-wing with curved streak near the base, inner band, outer row of recurved spots, submarginal line of lunular marks, and marginal row of spots, white; abdominal margin greyish. Expanse $2\frac{1}{2}$ inches.

Hab. Java? In the Collection of the British Museum, Dr. Horsfield, and J. O. Westwood, Esq.

17. *ATHYMA KANWA*, Moore. (Pl. LI. f. 2.)

Athyma Kanwa, n. sp. Female.—Upper-side brown-black; fore-wing with discoidal streak in two portions, the first long, slightly clavate, the second large and triangular; two small oval oblique spots near the apex, the two outer the smallest; a round spot in middle of the disc, and a spot and a dot on middle of posterior margin; an ill-defined submarginal row of narrow marks, white; hind-wing with inner and outer narrow band, white, divided by the veinlets; also an indistinct pale brown submarginal line. Under-side paler, with darker patches between the veins; markings as above. Body with two transverse bluish-white bands. Expanse $2\frac{2}{3}$ to $2\frac{3}{4}$ inches.

Hab. Borneo. In Collection British Museum, and East India Company.

18. *ATHYMA ASURA*, Moore.

Athyma Asura, Moore, Catal. Mus. E. I. C. i. p. 171. pl. 5 a. f. 1 (1857).

Athyma Asura.—Upper-side smoky-brown; markings creamy-white; fore-wing with a narrow discoidal streak, which is terminated at a short distance by an angular mark; a band of spots curving outwards from anterior to middle of posterior margin, the first spot commencing as a very narrow line, second and third long and oval, fourth the smallest, fifth somewhat larger and rounded, sixth larger still and oval, seventh the largest, square, indented at the side, eighth narrow and on posterior margin; a submarginal row of well-defined lunular marks, terminated on the apex of the wing by an inner row of three small spots; hind-wing with a broad inner band, also a less broad band from abdominal to anterior angle, this being intersected by the veinlets, and having a single black spot in the middle between each veinlet; marginal line in both wings pale brown. Body with a narrow bluish-white collar and band across the base of the abdomen. Under-side bright ferruginous; markings as above, but the fore-wing has the submarginal row of marks broad, and having a black spot in the middle of each; also a marginal row of small spots; some black lines bordering the discoidal marks, also a small black circle near base of wing, and a patch of black on posterior margin near the angle; hind-wing with the inner and spotted outer band the same as above; a bluish-green curved line across the base of wing, and a marginal row of lunular spots. Body and upper part of abdominal margin bluish-green. Sexes alike. Expanse 3 inches.

Hab. N. India. In Collection India House, British Museum, W. W. Saunders, Esq., W. C. Hewitson, Esq., and Hopeiau Museum at Oxford.

Remark.—This species may be distinguished from all others by the outer band on the hind-wings having a central spot between each vein.

19. *ATHYMA SULPITIA.*

Papilio Sulpitia, Cramer, Pap. Exot. iii. t. 214. f. E. F (1782), nec Fabr.

Acca Sulpitia, Hübner, Verz. bek. Schmett. p. 44.

Nymphalis Strophia, Godart, Enc. Méth. ix. f. 431 (1819).

Athyma Strophia, Westwood in Doubleday and Hewitson's Diurnal Lep. p. 274. n. 4.

Hab. China. In Collection W. W. Saunders, Esq., and W. C. Hewitson, Esq.

20. *ATHYMA SANKARA.*

Limenitis Sankara, Kollar in Hügel's Kaschmir, iv. pt. 11. p. 428 (1844).

Hab. Masuri, N. W. India (*Kollar*).

Remark.—We have been unable to identify this species from the description by Kollar.

21. *ATHYMA JINA*, Moore.

Athyma Jina, Moore, Catal. Lep. Mus. E. I. C. i. p. 172. pl. 5a. f 3 (1857).

Athyma Jina. Male. — Upper-side smoky-brown; markings creamy-white; fore-wing with the discoidal streak *entire*, long, broad and thickening to the extremity; a series of seven spots from subcostal vein, curving outward to middle of posterior margin, the first being small, second larger, broader, third narrow, fourth small, fifth larger, oval, sixth the largest, somewhat square and indented at the side, seventh narrow, elongated, triangular; a submarginal row of rather indistinct spots, those on the apex broadest; hind-wing with inner band somewhat narrow; outer band composed of broad lunulated spots. Band at the base of the abdomen whitish. Under-side brilliant ferruginous, posterior margin of the fore-wing blackish; markings the same as above, but the fore-wing with an additional spot on costal margin to the curved row; extreme exterior margin blackish, bounded inwardly by a submarginal row of white lines; hind-wing with the inner band extending across abdominal margin; space between base of wing and costal vein white; extreme exterior margin blackish, bounded inwardly by a marginal row of narrow lunular marks. Body white. Expanse 3 inches.

Hab. Darjeeling, N. India. In Museum East India Company.

Remark.—This species may at once be distinguished by the discoidal streak being *entire*.

22. *ATHYMA PRAVARA*, Moore.

Athyma Pravara, Moore, Catal. Lep. Mus. E. I. C. i. p. 173. pl. 5 a. f. 4 (1857).

Athyma Pravara.—Upper-side smoky-brown, markings creamy-white; fore-wing with an *entire* club-shaped streak; a transverse row of spots curving outward from costal vein towards the apex, to middle of posterior margin, the first and second spot being rather large and square, the third much smaller, the fourth a mere dot, the fifth the largest and oval, the sixth large and indented at the sides, the last narrow; a row of submarginal linear-shaped spots, more or less distinct; hind-wing with a broad inner band, and a narrow band of spots curving outwardly from anal angle to anterior angle; a submarginal line and abdominal margin light brown. Body with a narrow bluish-white band across the thorax, and another across the base of the abdomen. Under-side paler brown, with markings as above, but with dark-brown patches between the markings. Body and abdominal margin greyish. Sexes alike. Expanse $2\frac{1}{2}$ inches.

Hab. Java; Borneo. In Museum East India Company, and W. C. Hewitson, Esq.

23. *ATHYMA ILLIGERA*. (Pl. LI. f. 4.)

Limenitis Illigera, Escholtz in Kotzebue's Voy. t. 8. f. 17.

Neptis Illigera.—Upper-side brown-black; fore-wing with ill-defined brownish-white *entire* discoidal streak; a large spot crossed by a vein in middle of the disc, and a small spot on middle of posterior margin, white; also several transverse series of small white spots at the apex; hind-wing with a broad white inner band; an indistinct narrower outer band, marginal line and line between the bands, pale brown. Under-side as above, with all the markings white. Sexes alike. Expanse $2\frac{1}{8}$ inches.

Hab. Manilla. In collection British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

24. *ATHYMA DAMA*, Moore. (Pl. LI. f. 5.)

Athyma Dama, n. sp. Female.—Upper-side brown-black; fore-wing with narrow straight line within discoidal cell, and a parallel large longitudinally oval spot white, the narrow line tinged at the base with yellow; two small subapical spots, a larger spot on lower part of disc, and two narrow spots on posterior margin, white; an ill-defined brownish-white marginal and submarginal spotted line; hind-wing with broad white inner band, and a narrow outer band, marginal line, and line between the bands, pale brown. Under-side as above, but tinged with ferruginous; all the markings white. Expanse $1\frac{2}{10}$ inch.

Hab. Manilla. In collection of W. W. Saunders, Esq., and W. C. Hewitson, Esq.

25. *ATHYMA KASA*, Moore. (Pl. LI. f. 6.)

Athyma Kasa, n. sp. Female.—Upper-side smoky brown; fore-

wing with ill-defined whitish discoidal streak, in three portions ; from costal margin near the apex three narrow spots, oblique ; in middle of disc two large spots, and two on middle of posterior margin, broad, white ; an indistinct marginal and submarginal pale brown line, the latter anteriorly spotted with white ; hind-wing with broad white inner band, and very narrow line of whitish lunulate marks, bounded above with a lunular black spot ; an indistinct black line between the band and the latter ; an indistinct pale brown marginal line. Under-side ochreous-red, with darker margins, markings as above, the interstices with patches of black ; spots at base of wings, and row of spots within the outer band and another row between the two bands of the hind-wing, black ; marginal lines white. Abdominal margin and body greenish-grey. Expanse 3 inches.

Hab. Philippine Islands. In British Museum Collection.

26. *ATHYMA GUTAMA*, Moore. (Pl. LI. f. 7.)

Athyma Gutama, n. sp. Female.—Upper-side smoky-black ; fore-wing with ill-defined brownish-white discoidal streak, straight, entire ; three oblique spots from costal margin near the apex, and three to the middle of posterior margin, white, the first of the latter being large and oval, the second square, the third narrow ; an ill-defined margin and submarginal brownish-white lines, the submarginal anteriorly being spotted with white ; hind-wing with broad white inner band, and narrow brownish-white outer band ; marginal line and line between the band brownish. Under-side rather paler, with markings as in upper-side, but more defined and all white, except the line between the bands of the hind-wing and an irregular line outside the oblique spots of the fore-wing, which are ochreous. Expanse $2\frac{3}{4}$ inches.

Hab. Manilla ; Philippine Isles. In collections of the British Museum, and W. W. Saunders, Esq.

27. *ATHYMA VENILIA*.

Papilio Venilia, Linnæus, Syst. Nat. ed. 10. n. 120 (1767) ; Clerck, Icon. t. 32. f. 4 ; Fabricius, Ent. Syst. iii. 1, p. 134 ; Cramer, Pap. Exot. iii. t. 219. f. B. C.

Nymphalis Venilia, Godart, Enc. Meth. ix. p. 433.

Hab. Java ; Ceram or Amboyna (*Madame Pfeiffer*). In collection British Museum, W. W. Saunders, Esq., and W. C. Hewitson, Esq.

3. DESCRIPTIONS OF ELEVEN NEW SPECIES OF LAND-SHELLS,
FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L.
PFEIFFER.

(Mollusca, Pl. XL.)

1. *HELIX WALLACEI*, Pfr. *T. subperforata, subconoideo-depressa, solidula, leviter striata, pallide isabellina, fusco-unizonata et*



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6



7



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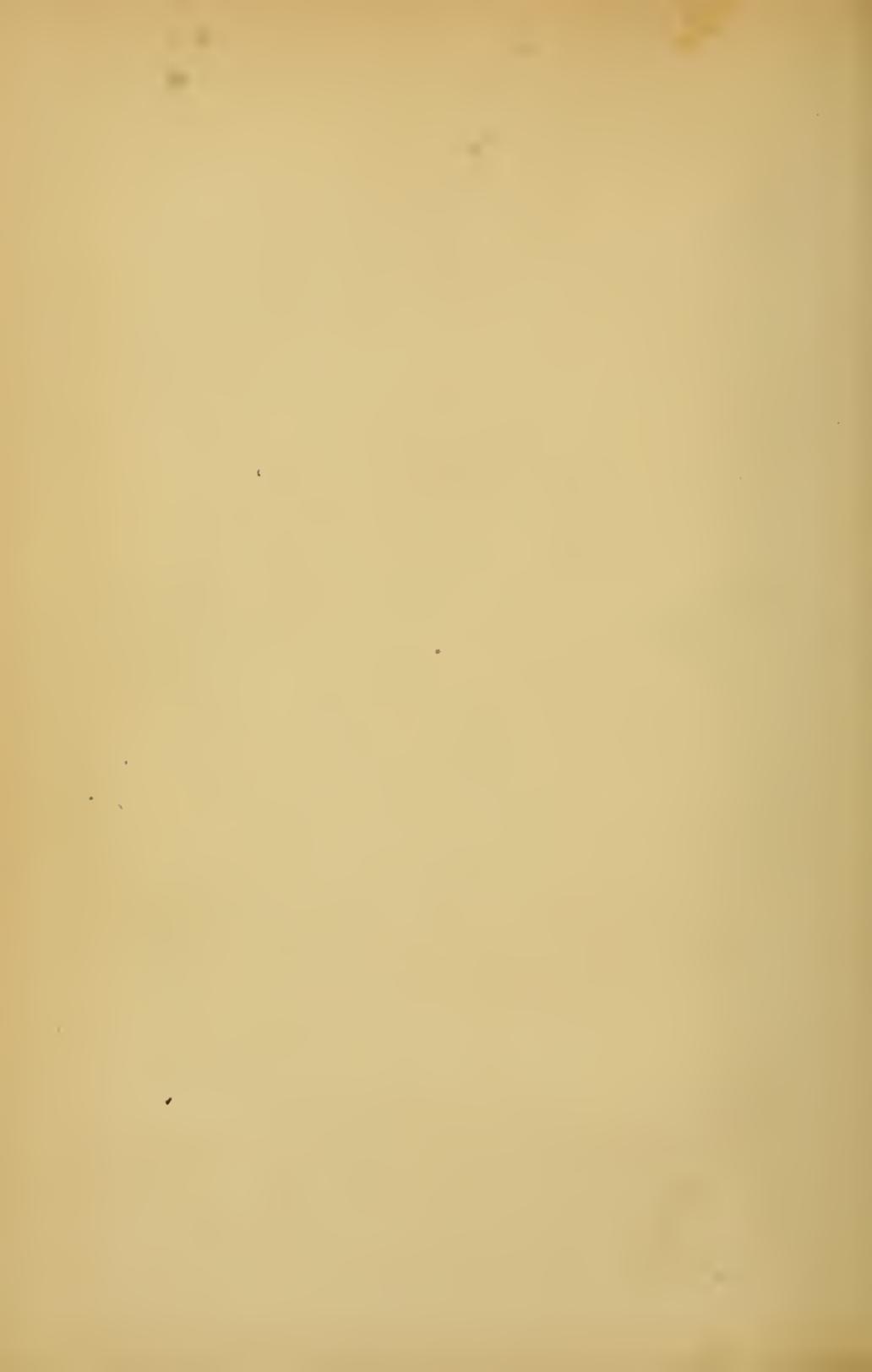


10



11

1 *Cylindrella eximia* 2 *Bulimus Martii*
 3 *Helix Erioi* 4 *H. Puteana* 5 *H. Wallacei*
 6 *H. casta* 7 *H. celsa* 8 *Archamoeba zemma*
 9 *A. cinnamomea* 10 *A. minuscula* 11 *A. solcata*



punctis pellucidis nigricantibus conspersa; spira convexa, vertice subtili, prominulo; sutura albo-marginata; anfr. 5 vix convexiusculi, regulariter accrescentes, ultimus antice deflexus, basi pallidior, obsolete spiraliter sulcatus; apertura obliqua, late lunari-ovalis, intus saturate castanea; perist. rectum, marginibus remotis, columellari ad perforationem in laminam triangularem reflexo.

Diam. maj. 31, min. $26\frac{1}{2}$, alt. 17 mill.

β3. *Minor, punctis pellucidis pallidis, apertura intus alba, castaneo-unifasciata.*

Hab. Macassar (Mr. Wallace).

2. **HELIX TESTUDO**, Pfr. *T. imperforata, trochiformis, solidula, striatula et rugis obliquis decussata, pallide isabellina, muculis et flammis fuscis picta; spira conoideu, acutiuscula; sutura carinato-marginata; anfr. 5 convexiusculi, regulariter accrescentes, ultimus acute carinatus, superne tumidus, antice vix deflexus, basi subplanulatus; apertura perobliqua, rhombo-lunaris; perist. albidum, margine supero expanso, basali reflexo, columellari lato, planato, adnato.*

Diam. maj. 35, min. 28, alt. 17 mill.

Hab. Madagascar.

3. **HELIX CONGRUA**, Pfr. *T. imperforata, trochiformis, solidula, striatula, carnea, fasciis fuscis varie picta; spira subconconvonica, apice obtusiuscula; anfr. 6 convexiusculi, ultimus irregulariter inflatus, vix descendens, distinctius costulato-striatus, basi planiusculus, nitidior; apertura diagonalis, subtetragono-ovalis; perist. nigro-castaneum, expansum, ectus striga lateritia cinctum, marginibus callo nigricante junctis, dextro dilatato, columellari lato, complanato.*

Diam. maj. 29, min. 25, alt. 24 mill.

Hab. Admiralty Islands (Dr. Purchas).

4. **HELIX PURCHASI**, Pfr. *T. imperforata, globoso-depressa, tenuissima, confertissime plicatula et sub lente subdecussata, aeneo-micans, pellucida, pullide cornea; spira breviter conoidea, obtusa; sutura marginata; anfr. vix $3\frac{1}{2}$ planiusculi, rapide accrescentes, ultimus non descendens, medio carina compressa, acuta, alba munitus, subtus inflatus, basi gibbosus; apertura ampla, obliqua, late angulato-lunaris; perist. tenue, breviter reflexum, margine columellari arcuato, compresso, subcalloso, juxta foveam centralem non dilatato.*

Diam. maj. 23, min. $17\frac{1}{2}$, alt. $13\frac{2}{3}$ mill.

Hab. Admiralty Islands (Dr. Purchas).

5. **HELIX FRICKI**, Pfr. *T. late umbilicata, lentiformis, tenuiuscula, striata, corneo-lutescens, strigis et maculis rufis ornata; spira breviter conoidea; sutura marginata, subexcavata; anfr. 7 plani vel concaviusculi, ultimus subdeflexus, acute carinatus, circa um-*

bilicum ($\frac{1}{4}$ diametri superantem) tumidulus; apertura obliqua, securiformis, ringens; lamellis 2 in pariete aperturali, nulla in margine columellari, 4 minoribus in basali, 1 in supero; perist. rectum, acutum.

Diam. maj. 8, min. $7\frac{1}{2}$, alt. 3 mill.

Hab. Sandwich Islands (Dr. Frick).

Differt ab H. lamellosa, Fér., sculptura, umbilico lato et deficiente plica columellari.

6. ACHATINELLA (NEWCOMBIA) CINNAMOMEA, Pfr. *T. imperforata, sinistrorsa, fusiformi-turrita, solidula, opaca, longitudinaliter plicatula, spiraliter sublirata et brevissime granulata, cinnamomea; spira elongata, subrectilinearis, apice acutiuscula; sutura subsimplex; anfr. 6 vix convexiusculi, superi fusco et albido marmorati, ultimus $\frac{2}{5}$ longitudinis subæquans, infra medium attenuatus, castaneus; columella simplex, recedens; apertura parum obliqua, semiovalis, basi subangulata; perist. simplex, rectum, acutum.*

Long. 19, diam. 5 mill.; ap. $7\frac{2}{3}$ mill. longa, 3 lata.

Hab. Sandwich Islands (Dr. Frick).

7. ACHATINELLA (NEWCOMBIA) GEMMA, Pfr. *T. subimperforata, sinistrorsa, oblongo-turrita, solidiuscula, striatula et spiraliter lirata (liris planiusculis, conferte sulcatis), alba; spira turrita, apice acutiuscula; sutura submarginata; anfr. 7, superi plani, obsolete fusco-variegati, sequentes convexiusculi, ultimus $\frac{2}{5}$ longitudinis subæquans, medio lira acutiore subcarinatus; columella leviter plicata; apertura parum obliqua, obauriformis; perist. subsimplex, margine columellari subreflexo, externo expansiusculo.*

Long. 17, diam. $6\frac{1}{2}$ mill.; ap. 7 mill. longa, 3 lata.

β. *Fulvo-lutescens, anfractibus superis saturate corneo-strigatis.*

Hab. Sandwich Islands (Dr. Frick).

8. ACHATINELLA (NEWCOMBIA) SULCATA, Pfr. *T. subperforata sinistrorsa, oblongo-turrita, solidula, striatula et liris confertis, in anfr. superioribus compressis, tum rotundatis cincta, castanea, nitidula; spira regulariter attenuata, apice acutiuscula; sutura subsimplex; anfr. fere 6 planiusculi, supremi albo-flammulati, ultimus $\frac{2}{5}$ longitudinis subæquans, basi saccatus, saturatius castaneus; columella levissime plicata; apertura obliqua, acuminato-ovalis; perist. tenue, margine columellari superne dilatato, reflexo, externo expansiusculo.*

Long. $12\frac{1}{2}$, diam. $5\frac{2}{3}$ mill.; ap. $5\frac{2}{3}$ mill. longa, $3\frac{1}{3}$ lata.

Hab. Sandwich Islands (Dr. Frick).

9. ACHATINELLA (NEWCOMBIA) MINUSCULA, Pfr. *T. subimperforata, sinistrorsa, ovato-turrita, tenuiuscula, sub lente minute decussata, vix nitidula, fuscescenti-albida; spira turrito-conica, apice obtusiuscula; sutura simplex; anfr. 5 vix convexiusculi, mediani fusco-variegati, ultimus spira paulo brevior, fascia fusca*

circumdatus et basi rotundata fusco-areolatus; columella vix plicata; apertura parum obliqua, semiovalis; perist. simplex, acutum, margine columellari superne dilatato, reflexo.

Long. 10, diam. 5 mill.; ap. $4\frac{1}{2}$ mill. longa, $2\frac{2}{3}$ lata.

Hab. Sandwich Islands (*Dr. Frick*).

10. *CYLINDRELLA EXIMIA*, Pfr. *T. vix rimata, cylindraco-turrata, solidula, confertissime subgranulato-striatu, opaca, pallide violaceo-fulvida; spira sensim attenuata, late truncata; anfr. superst. 8 vix convexiusculi, supra suturam interstitiis nudis subcrenati, ultimus vix solutus, basi acute carinatus; apertura subcircularis, basi angulata; perist. tenuis, undique expansiusculum.*

Long. 27, diam. medio $7\frac{1}{2}$ mill.; ap. diam. 5 mill.

Hab. — ?

11. *BULIMUS MARLE*, Albers. *T. anguste umbilicatu, oblongo-conica, solida, sublævigata, alba, punctis et strigis obsoletis corneis plerumque notata; spira conica, acuta; anfr. $6\frac{1}{2}$ convexiusculi, ultimus spiram subæquans, basi vix attenuatus; columella plicæ parvula, dentiformi munita; apertura vix obliqua, acuminato-oblonga, intus fusca; perist. rectum, margine dextro leviter arcuato, columellari sursum dilatato, patente.*

Long. 33, diam. 14–15 mill.; ap. 16–17 mill. longa, $7\frac{1}{2}$ lata.

β. *Anfractibus superis corneis, lacteo punctato-strigatis, ultimo strigis lacteis denticulatis et violaceo-corneis alternantibus picto.*

Hab. Texas.

4. DESCRIPTION OF A NEW CYRENA FROM CEYLON, AND OF NEW SIPHONARIÆ. BY SYLVANUS HANLEY, F.L.S., ETC.

CYRENA TENNENTII. *Testa ovato-subtrigona, solida, ventricosa, inæquilaterali, sublævigata, epidermide tenui impolita fuscolutescente vestita: umbonibus tumidis, decorticatis, valde prominentibus, vix obliquis; latere antico anguste rotundato; latere postico longiore subattenuato, ad extremitatem obtuse rotundato; margine ventrali arcuato; margine dorsali antice declivi, convexo, postice subdeclivi, convexiusculo; lunula nulla; superficie interna albido-violascente; dentibus lateralibus brevibus, validis, obtusis; antico approximato, postico remoto: sinu palliari brevissimo, acutissimo.*

Long. 13 lin., lat. 18 lin.

Hab. In fluvio Ariho Taprobanensi.

This remarkable-looking species, which reminds one slightly of *Gnathodon cuneatus*, forms part of the interesting collection of Sir Emerson Tennent, who took it from the pools of the Ariho River (which flows into the Gulf of Manar), below the great stone dam, by which it was intended to divert the water, in order to supply the Giant's Tank.

I observe no species in Deshayes's most useful, though crude, monograph, which at all resembles it in aspect. Its dentition fixes it in *Cyrena* proper: the hinge-margin is strong, and the cardinal teeth of the right valve peculiarly large. The inner disk, beneath the umbones, has a redder tint; there is neither a lunule, nor any indication of an umbonal ridge.

SIPHONARIA BRUNNEA. *S. testa solida, obovali, pyramidato-subdepressa, vel omnino brunnea, vel (in junioribus) costarum brunnearum interstitiis subalbidis; costis permultis parvis (haud autem filiformibus) saturatioribus subrotundatis radiata; vertice albido, subcentrali, subacuto, aliquantulum adunco; lateribus æqualibus; angulo siphonali satis conspicuo; superficie interna albida, vix ad marginem crenatum brunneo colore articulata.*

Long. $10\frac{1}{2}$ lin., lat. 9 lin.

Hab. In insula Bermuda. Mus. Cuming.

The only four examples known to me are somewhat (though slightly) rubbed, so that it is difficult to say whether the moderately raised ribs are smooth or nodosely crenated. From the prevalence of interstitial costellæ, especially posteriorly, the number of decided ribs (none of which are peculiarly conspicuous) seems variable with age: the range is apparently from thirty to forty.

S. CARBO. *S. testa solida, subsymmetrica, rotundato-ovali, pyramidato-subdepressa, extus intusque ubique picea; costis permultis, haud autem confertis, subnodosis, et satis elevatis radiata: vertice centrali, recto, simplici: lateribus æqualibus: margine crenato: impressione siphonali intus (vix etiam extus) conspicua.*

Long. 11 lin., lat. $9\frac{1}{2}$ lin.

Hab. —? Mus. Cuming.

The only individual known to me might pass externally for *S. brunnea*, and internally for a dwarf *characteristica*. From the former it is readily distinguished by the uniform and intense darkness of its somewhat bronzed interior, from the latter by its very numerous and close-set ribs, which are apparently equal in breadth, and more or less blunt.

S. PARMA. *S. testa obovata, pyramidato-depressa, solida, subsymmetrica, albida, costis permultis confertis subæqualibus rotundatis muticis (vix autem lævigatis) radiata; interstitiis linearibus castaneis: lateribus æqualibus: vertice centrali, simplici, subacuto: costa siphonifera duplici satis conspicua: pagina interna superne ferruginea, ad marginem crenatum albida.*

Long. $8\frac{1}{2}$ lin., lat. 8 lin.

Hab. In Africa Occidentali. Mus. Cuming.

The only individual I have seen is disposed to be much dilated posteriorly, and is livid around the prominent umbo: these charac-

ters may prove to be accidental, and not specific. Its ribs, which are very slightly worn, have here and there a subnodulous aspect: upon the whole it approaches the typical *sipho* (which I regard as perfectly distinct from *exigua*), but is more conic, with the ribs much more elevated, and with very distinct interstitial colouring.

S. EXULUM. *S. testa parva, solida, ovali-rotundata, pyramidato-subdepressa, subsymmetrica, nigro-cærulescente, costis multis cinereis parvis obtusis plerumque alternatis haud confer-tim radiata: vertice centruli, lævi, nigro-fuscescente, simplici, obtusiusculo: latere siphonifero aliquantulum majore: margine subintegro: pagina interna picea, ad apicem pallidiorè, vel subalbida, ad marginem albido brevissime radiata.*

Long. 7 lin., lat. 6 lin.

Hab. Norfolk Island. Mus. Hanley.

Very distinct from any species known to me. In the example described there are about forty unarmed ribs, of which a dozen upon the hinder two-thirds of the shell are peculiarly prominent, and spring immediately from the erect vertex. There are indications of an epidermis, and of faint and crowded concentric striolæ.

S. REDIMICULUM, var. *S. testa parva, tenui, ovato-oblonga, arcuato-subconica, fusco albidoque zonata; costis elevatis, muticis, subæqualibus, rotundatis, subdistanter radiata; luteribus valde inæqualibus: vertice valde excentrico, postico, in junioribus adunco: costa siphonifera inconspicua: pagina tota interna fusco-purpurascente.*

Long. $6\frac{1}{2}$ lin., lat. $4\frac{3}{4}$ lin.

Hab. —? Mus. Hanley.

The comparative smoothness and almost uniform external colouring of the previously described form of this remarkable-looking shell have rendered it desirable to redescribe the species. No interstitial sculpture is present; the ribs scarcely exceed twenty in number.

5. A MONOGRAPH OF THE GENUS NYCTOPHILUS.

By ROBERT F. TOMES.

The characters of the present genus were first briefly given by Dr. Leach in a communication to the Linnean Society in March 1820, which was not, however, published until 1822.

The paper is intitled, "The characters of seven genera of Bats with foliaceous appendages to the nose;" the seven genera being *Artibeus*, *Monophyllus*, *Mormoops*, *Nyctophilus*, *Megaderma*, *Fampyrus*, and *Madateus*.

From the manner in which *Nyctophilus* is here associated with the other genera, it seems not unfair to assume that Dr. Leach regarded it as more or less closely allied to them; and they, with the exception perhaps of *Mormoops*, all appertain to the *Phyllostomide*.

M. Temminck, in his monograph of the genus, gives it as his opinion that it may properly be placed between *Rhinolophus* and

Nycteris; and Dr. Gray, although arranging it amongst the *Vespertilionidæ*, or Simple-nosed Bats, nevertheless places it immediately after *Nycteris*, which he considers as belonging to the *Vespertilionidæ* also. But *Nycteris* is thought by some zoologists to have some affinity with the *Rhinolophidæ*, and my own repeated examinations have convinced me that it is simply a modification of *Rhinolophus*.

From this it would seem that the genus *Nyctophilus* has always been considered by those who have studied the subject as either belonging to the *Istiophori* or Leaf-nosed Bats proper, or as having some affinity with them.

It will be the purpose of the present paper to show that the genus *Nyctophilus* is not more remote from the genus *Vespertilio*, than are the genera *Barbastellus* and *Plecotus*, and further to show that it is as intimately allied to the last of these as to any other genus.

In the course of a very careful study which I have made of the crania of a number of examples, I have detected one or two errors in the account given of the dentition, both by Dr. Leach and M. Temminck. These will be pointed out in their proper place.

Fam. VESPERTILIONIDÆ.

Genus NYCTOPHILUS.

The top of the head is but slightly elevated, not more so than in *Plecotus auritus*, and the muzzle is relatively of about the same length and substance as in that species. The forehead, between the eyes, is a little depressed, producing a slight hollow somewhat as in the genus *Taphozous*, but in a much less degree. The nose-leaves are simple; the first is placed immediately above the nostrils; it is transverse, and there is a kind of thickened line or ridge passing from the lower margin of the nostrils on each side, and uniting with its outer boundaries. The upper margin of this leaf is straight and even. The second nose-leaf is placed at a greater distance from the first, than the first is from the nostrils. It also is transverse, but is higher in the middle than at the sides, is much thicker in substance, and is thickly clothed with short bristly hairs. The nostrils are small and not prominent, nearly round when seen in front, but with a backward narrow extension nearly reaching to the outer margin of the first nose-leaf, when examined laterally. The ears are large,—about one-fourth longer than the head,—regularly ovoid, and one-fourth longer than wide. They are united at their bases by a piece of transverse membrane across the top of the head, as in *Plecotus*. This membrane is not attached to the inner edge of the ears, but to their hinder surface, so as to leave the margins free. It extends for nearly one-third of the length of the ear. The tragus is short and broad, but rather thin and membranous. Quite at its root it is narrow; but it suddenly attains its full breadth, and taking at once a vertical direction, tapers somewhat unevenly to a narrow but rounded point. The outer margin, near to the base, is the most prominent

part; it is rounded, and in some individuals with one or two projecting points. Above this prominence, about the middle of the outer margin, it is slightly hollowed or scooped out, and the inner margin has a corresponding prominent outline immediately opposite to this hollow. The tip is much narrower than any other part of the tragus, but it is nevertheless quite rounded. Although the general form of the tragus is pretty similar in all the examples I have seen, yet it appears liable to greater variations than is usual in most species of *Vespertilionidæ*. For instance, in some examples the margins, although possessing a somewhat undulating outline, are nevertheless smooth; whilst in others the whole of the outer one is finely crenulated; again, the tip is sometimes curved a little inwards, but in others it is quite straight.

The organs of flight so exactly resemble those of the genus *Vespertilio*, that it is needless to make further remarks on them, excepting to mention that the wing-membranes spring from the base of the toes.

All the hinder extremities may be similarly dismissed.

The cranium in its general appearance resembles that of several species of *Vespertilionidæ*, and so nearly, that it would be easy at first sight to confound them. The *Serotine Bat* of Europe, the *Scotophilus Carolinensis* and *Vespertilio velatus* of America, but more especially a species inhabiting the same country as the *Nyctophilus*, viz. *Vesp. Tasmaniensis*, may be cited as species, the crania of which are most like that of *Nyctophilus*.

The cerebral portion is but little elevated above the facial portion, and it rounds off but very little from the vertex to the occiput, above the foramen of which is a moderately developed occipital crest, varying considerably in different species. There is the same deep notch in the anterior part of the skull which is observable in *Vespertilio* and *Scotophilus*, caused by the imperfect development of the intermaxillary bones. Immediately above this notch is a rather broad but shallow depression, occupying the position of the nasal bones. It is as deep from side to side as from before to behind; but there is one point where it runs a little deeper than elsewhere, just at the hinder ends of the nasal bones. Precisely the same kind of depression occurs in the cranium of the *Barbastelle Bat*. But in *Nyctophilus* the depression is rendered more conspicuous by the somewhat more elevated position of the *malar processes*.

The zygomatic arches are not very much arched outwards, less so than in many species of *Vespertilio*, such as *V. Nattereri*, but quite as much so as in *Plecotus*. The orbits extend rather markedly forward, in one species almost to the root of the canine tooth, whilst the palatal portion of the maxillary bones reaches as far back as usual, so as to give a somewhat greater extent of *floor* to the orbit than usual. The bony palate extends backwards almost to the condyloid fossa; but its hinder margin is so much scooped out that its middle does not much exceed the middle of the zygomatic arch, in a backward direction. In this respect it resembles the same part in *Plecotus*; in *Barbastellus*, *Vespertilio*, and *Scotophilus* it is doubly emarginate.

The teeth of the upper jaw, when seen from below, present two straight lines, somewhat diverging towards their hinder ends, just as in *Vesp. velutus*, *Scot. serotinus*, *Scot. Carolinensis*, and *Barbastellus*. The two incisors are the only teeth which deviate from these lines, being placed more inward than the canines, which terminate them. Seen laterally, the upper teeth have a curved outline, bending slightly upward from the root of the zygoma to the most anterior part of the intermaxillary bone. The exact form of the lower margin of the maxillary and intermaxillary bones is tolerably well indicated by the range of the teeth, as just stated; and it may be here remarked, that this is a point worthy of attention in the classification of the *Vespertilionidæ*.

The lower jaw so closely resembles that of the generality of the *Vespertilionidæ*, that I consider it only necessary to state that it appears to resemble the same part in *Scot. Noctula* as closely as in any other species, differing only in having the coronoid process a little more elevated.

Commencing the description of the teeth themselves with the upper incisors, I find them to be two in number, short and conical, and furnished with a distinct *cingulum*, which passes into a point on the hinder side of the tooth, well defined in some species, but scarcely observable in others. In those in which it does occur, it constitutes a peculiarity quite distinct from the bifid incisors of some species, such as the *Barbastelle*, where the *cingulum* is left entire, and the apex of the tooth appears as if cleft.

The canines are somewhat shorter and relatively a little stouter than in *Vespertilio* and *Plecotus*, and also shorter but not stouter than in *Scotophilus*. The next tooth, the only premolar in the upper jaw, and the following three true molars, have the form and proportions so usual in the *Vespertilionidæ*, that they require no special notice, excepting to state that the posterior one is a little smaller than is generally observable.

In describing the teeth of the lower jaw, two errors which have been made respecting their number require correction. Dr. Leach states that the lower incisors are six in number, and M. Temminck, describing afterwards from the same specimen, could find but four. After diligently examining a considerable number of skulls, I have satisfied myself that the account given by Dr. Leach is correct, for in no instance can I discover less than six lower incisors; but in two examples the outer one on each side is wholly hidden by the one next to it, so that unless the skull be carefully cleared of the investing membranes, it would be extremely difficult to see more than four of these teeth; hence has probably arisen the error.

They are cylindrical at the base, and for a considerable part of their length; but expand into flattened fan-shaped summits, having three lobes or points. The canines are of the usual form, and are not, as has been stated, furnished with a posterior lobe or spur. What has been mistaken for a part of the canine, is in fact a small and pointed premolar, placed so close behind it as to seem continuous with it. On instituting an examination of the canines, and comparing them with those of other species, I find that the *cingulum* is

not so much developed posteriorly as in many others. In the common *Noctule*, for instance, although the canine presents only a mere trace of thickening of the base anteriorly, it nevertheless passes into a small but distinct spur or point behind. The small anomalous premolar alluded to is situated in the same line with the teeth, between which it is placed in such a manner as to be equally visible from within or without. Its form is conical. The next tooth is also regularly conical, and furnished with a broad basal collar or *cingulum*; after this come the three true molars, presenting the form common to all the *Vespertilionidæ*.

The dentition of the genus may be given as follows; and as that of all the species is numerically similar, it will render repetition unnecessary.

Dentition.—In. $\frac{1.1}{6}$; C. $\frac{1.1}{1.1}$; P. M. $\frac{1.1}{2.2}$; M. $\frac{3.3}{3.3} = \frac{12}{18}$.

1. NYCTOPHILUS GEOFFROYI, Leach.

Nyct. Geoffroyi, Leach, Linn. Trans. xiii. p. 73, 1820–22; Less. Man. p. 86, 1827; Fisch. Synop. Mamm. p. 135, 1829; Temm. Mon. ii. p. 47, 1835–41; Wagn. Supp. Schreib. i. p. 442, 1840; Less. Nouv. Tab. Règn. Anim. p. 33, 1842; Schinz. Synop. Mam. i. p. 217, 1844.

Of the three species treated of in the present monograph, the first, from its size, is unquestionably the one on which Dr. Leach established the genus.

The original description in the Linnean Transactions is much too vague to discriminate the exact species with certainty; but M. Temminck having become possessed of the original specimen, and given a more detailed description of it, I am enabled to determine with certainty which of the species here given is the true *N. Geoffroyi*.

I intend, therefore, first to give a description of this species, and then to point out briefly what I consider sufficient differences to constitute three other species. One of these has indeed been repeatedly described as a *Vespertilio*—*Vesp. Timoriensis*; but it is strictly a *Nyctophilus*, as I have ascertained by the examination of the original specimen in the Paris Museum.

The face is moderately hairy, the hairs being pretty regularly scattered, but a little thicker on the upper lips and on the second nose-leaf than elsewhere. Immediately over the eye is a small tuft of bristle-like black hairs, and a similar one near the hinder corner of the eye. At the angle of the mouth a few similar hairs may be observed. The fur of the back extends to a very trifling extent on to the interfemoral membrane, but all the other membranes are perfectly naked, and of a dark brown colour, as are also all the other naked parts, with the exception of the tragus and the contiguous parts of the inside of the ear, which are brownish-yellow.

The fur of the body is rather long, thick, and very soft.

On all the upper parts it is conspicuously bicoloured, black for nearly two-thirds of its length, the remainder being olive-brown, of which the extreme tips are rather the darker portion. On the membrane uniting the ears the fur is uniform yellowish-brown.

The fur of the throat and flanks is uniform brownish-white, that of the latter being sometimes more strongly tinted with brown. All the remaining under-parts have the fur markedly bicoloured, black at the base, with the terminal third brownish-white, varying considerably in purity of colour in different individuals.

In the following table of dimensions, the first column refers to a specimen in Mr. Gould's collection, very kindly lent by him for my use, and from which the foregoing description has been taken: it is labelled "Albany, King George's Sound, May 19th, 1843." The dimensions in the two other columns have been taken from specimens in my own collection, and are also from Western Australia, but the exact locality unknown.

The comparative description and measurements of the crania of this and the other species will be given in a collected form appended to the description of the species the last on the list, so as to render their differences more readily apparent:—

	1.		2.		3.	
	in.	lin.	in.	lin.	in.	lin.
Length of the head and body (about) ..	1	8	2	0	1	9
——— of the tail	1	4	1	5	1	5
——— of the head	0	7 $\frac{1}{2}$	0	8	0	8
——— of the ears	0	9	0	9	0	9
——— of the tragus	0	2 $\frac{1}{2}$	0	3	0	3
Breadth of the ears	0	6	0	6 $\frac{1}{2}$	0	7
——— of the tragus	0	1 $\frac{1}{4}$	0	1 $\frac{1}{4}$	0	1 $\frac{1}{2}$
Length of the fore-arm	1	4	1	4	1	4
——— of the longest finger	2	4	2	6	2	6
——— of the fourth finger	1	9	1	10	1	10
——— of the thumb	0	2 $\frac{3}{4}$	0	3	0	3 $\frac{1}{2}$
——— of the tibia	0	7	0	7 $\frac{1}{2}$	0	7
——— of the foot and claws	0	3	0	3 $\frac{1}{2}$	0	3 $\frac{1}{4}$
——— of the os calcis	0	5	0	6	0	6
Expanse of wings, about	9	0	9	7	9	9

2. NYCTOPHILUS TIMORIENSIS.

Vesp. Timoriensis, Geoff. Ann. du Mus. viii. p. 200. t. 47, 1806; Desm. Mamm. p. 146, 1820; Fisch. Synop. Mamm. p. 118, 1829; Temm. Mon. ii. p. 253, 1835-41; Wagn. Supp. Schreib. i. p. 520, 1840; Schinz. Synop. Mamm. i. p. 175, 1844.

Vesp. Timoriensis?, Temm. Mus. Leyd.

Plecotus Timoriensis, Less. Mann. p. 97, 1827; Is. Geoff. Guérin, Mag. de Zool. 1832; Less. Nouv. Tab. Règn. Animal, p. 23, 1842.

The forms of this species are so similar to those of the last, that it is needless to enter at greater length into details of description than is necessary to point out the differences between the two.

In all the specimens I have been able to examine, viz. the original one in the Paris Museum, and three others collected in Australia by Mr. Gould, the ears are strongly sulcated, even more so than is observable in the *Plecotus auritus*, whilst in the last species they are very

faintly, if at all, so marked; and instead of the small tufts of bristle-like hairs about the eyes, the present species has a tolerably regular series of similar ones fringing the eyelids. Again, the cranium has so strongly marked a sagittal crest as to be easily detected in the mounted specimens, whereas in *N. Geoffroyi* it is so feebly developed that no trace can be discovered, unless the skull be extracted and carefully cleaned.

But the great difference in the size of the two animals is alone sufficient to distinguish them, the one being only 9 inches in expanse of wings, whilst the other attains fully 13 inches; nearly as great a difference as exists between the *Pipistrelle* and the *Noctule* Bats.

The fur of the upper parts is bicoloured, nearly black at the base, with the terminal half dark sepia-brown; that on the top of the head and on the membrane uniting the ears, unicoloured, and paler.

Beneath, the fur has the basal half nearly black, the remainder being light brown, palest on the throat, on the middle of the belly, and on the pubes. On the shoulder of one example from "Perth, Western Australia," is a patch of brownish rust colour, but it does not occur in the other examples.

Although the original specimen of this species is reported to have been received from Timor, I am inclined to believe that there may have been some mistake respecting its locality. Among a great number of Bats from that island contained in our museums and that of Leyden, representatives of this genus do not appear; but specimens absolutely identical with the original in the Paris collection have been obtained by Mr. Gould in Western Australia; and I have noted one in the Leyden Museum, also from Australia, but without any precise indication of locality.

The following dimensions have been taken from specimens collected by Mr. Gould, the first being the one from Perth, Western Australia:—

	1.		2.	
	in.	lin.	in.	lin.
Length of the head and body, about ..	3	0	2	4
— of the tail	1	10½	1	10
— of the head	0	10	0	10
— of the ears	0	10	0	10
— of the tragus	0	3½	0	3½
— of the fore-arm	1	9	1	9
— of the longest finger	3	4	3	2
— of the fourth finger	2	4	2	5
— of the thumb	0	4½	0	4
— of the tibia	0	9	0	9
— of the foot and claws	0	5	0	5
— of the os calcis	0	7	0	8
Expanse of wings, following the phalanges	13	6	12	9

3. NYCTOPHILUS GOULDI, n. s.

The present species is intermediate in size between the two last, and at first sight might be taken either for a small individual of *N.*

Timoriensis, or a large one of *N. Geoffroyi*; or these two might be regarded as the large and small varieties of the same species, and the present one as the intermediate or connecting link. This opinion I was at first disposed to entertain; but after the examination of a greater number of examples, and more especially after extracting a good number of their crania, I became convinced that they were all specifically distinct.

The shape of the head, face and ears, does not differ materially from that of the same parts in the two preceding species; the only perceptible difference beyond that of size being in the somewhat greater elevation of the top of the head. As in *N. Timoriensis*, the ears are strongly sulcated, and it bears general resemblance to that species in the quality and colouring of the fur.

The fur of the whole of the upper parts is very distinctly bicoloured: it might almost be called tricoloured; the basal half greyish-black, and the terminal half grey-brown, with the tips browner. On the rump the brown colour is rather more conspicuous than on the fore part of the back. The basal part of the upper surface of the interfemoral membrane is a little hairy in some specimens, but in others this is not observable.

On the whole of the under-surface the fur is strongly bicoloured, nearly black at the base, with the terminal third buffy grey. On the pubes the dark colour at the base of the fur is reduced to a small quantity, and it is almost wholly of the buffy white colour.

Young examples not having the wing-joints completely ossified, differ only in being somewhat smaller, and in having the fur less bright; but it is nevertheless distinctly bicoloured, and when obviously immature they are still of greater size than adult examples of *N. Geoffroyi*.

In the table of dimensions, column No. 1 refers to a female specimen from Mr. Gould's collection from Moreton Bay; No. 2 to a male from the same locality; and No. 3 to a specimen also collected by Mr. Gould at Bathurst.

	1.		2.		3.	
	in.	lin.	in.	lin.	in.	lin.
Length of the head and body, about ..	1	11	2	0		
——— of the tail	1	10	1	8		
——— of the head	0	9	0	9		
——— of the ears	1	0	0	11		
——— of the tragus	0	3	0	3		
Breadth of ears	0	8	0	8		
——— of the tragus	0	2	0	2		
Length of the fore-arm	1	7 $\frac{1}{2}$	1	6 $\frac{1}{2}$	1	7
——— of the longest finger	3	0	2	8	2	9
——— of the fourth finger	2	4	2	1	2	0
——— of the thumb	0	4 $\frac{1}{4}$	0	4	0	4 $\frac{1}{2}$
——— of the tibia	0	10	0	8 $\frac{1}{2}$	0	8 $\frac{1}{2}$
——— of the foot and claws	0	4	0	4	0	4 $\frac{1}{2}$
——— of the os calcis	0	6	0	6	0	6 $\frac{1}{2}$
Expanse of wings	11	6	10	9	11	4

4. NYCTOPHILUS UNICOLOR, n. s.

All the specimens of this genus I have yet seen from Van Diemen's Land differ remarkably from those of the mainland of Australia in having the fur everywhere short and cottony, perfectly devoid of lustre, and unicoloured.

That of the upper parts is of a dark olive-brown, without any variation of tint, excepting that it is perhaps a little darker along the middle of the back than elsewhere.

Beneath, the fur is similar, but paler in colour, with the tips of the hairs a little tinged with ash-colour. This is the colour of the whole of the under parts, with the exception of a patch on the throat, which is whitish-brown, dirty white, and occasionally pure white.

Immature examples often have the fur above and beneath of a very dark olive-brown, almost black. One specimen of this dark colour which I have examined, has the spot on the throat almost pure white.

So far as I have been able to ascertain, this species is subject to very trifling variations either in colour or size in the adult state, and the size agrees so closely with that of the species which I have called *N. Gouldi*, that I at first thought the great difference in the texture and colour of the fur was due to the difference of locality.

In the crania, however, I find such differences as are ample for the distinction of the species*.

The following dimensions are taken from three specimens collected by Mr. Gould in Van Diemen's Land; the first a male, and the second a female, both adult; and the third obviously immature.

	1.	2.	3.
	in. lin.	in. lin.	in. lin.
Length of the head and body (about)	2 0	2 2	1 10
— of the tail	1 10	1 8	1 7
— of the head	0 8½	0 9	0 8½
— of the ears	0 10	0 10	0 9½
— of the tragus	0 2	0 1¾	0 2
Breadth of the ears	0 7½	0 8	0 7½
— of the tragus	0 2	0 1¾	0 1½
Length of the fore-arm	1 7½	1 7	1 6½
— of the longest finger	2 10	2 8	2 1
— of the fourth finger	2 2	2 8	2 0½
— of the thumb	0 4	0 4¼	0 4
— of the tibia	0 8½	0 7½	0 7
— of the foot and claws	0 4½	0 4	0 3¾
— of the os calcis	0 7	0 6½	0 7
Expanse of wings	11 6	11 0	10 4

The crania of the four species here described, differ so considerably, that I deem it advisable to make mention of them apart

* To the description of this species should have been added, that the ears are destitute of sulci, and more membranaceous than in the other species, and that the wing-membranes are darker in colour and much more opaque and leathery.

from the foregoing description. By adopting this plan, I am enabled to bring them into more immediate comparison, which is highly desirable when we bear in mind the small size of the objects, and the consequent difficulty of rendering apparent their differences without the aid of figures. They will be described in the following order, the crania of the two species most removed from each other being found to be most dissimilar.

N. Timoriensis.—General form of the skull rather broad and flat, and rather thick in substance; sagittal and occipital crests moderately developed; depression of the nasal bones of nearly equal depth from side to side, broad, with the sides parallel for three-fourths of its length in a backward direction, and then narrowing rapidly to a point at the commencement of the sagittal ridge. Facial portion short; zygomatic arches considerably expanded. Palate nearly as wide anteriorly as posteriorly. Lower jaw strong, its lower margin considerably curved. All the teeth of moderate size and proportions.

N. Gouldi.—General form of the skull much less broad than in the last species, more elevated in the crown, and narrower anteriorly; sagittal crest considerably developed, the occipital one very small; facial depression almost obsolete, narrow, rounded-off on each, and only amounting to a concavity just at the posterior termination of the nasal bones. Facial portion relatively more produced than in the last species; zygomatic arches but little expanded. Palate much narrower in front than behind. Lower jaw as in the last species. All the front teeth, especially the upper canines, *very short and stout*.

N. unicolor.—General form of the skull very short, as broad relatively as in the first species, but not so flat, and much lighter and thinner in substance than in either of the preceding; sagittal ridge merely rudimentary, occipital one considerably elevated, especially its central portion; facial depression broad, of medium depth, well-defined, and narrower before and behind than in the middle, and with the outline of the nasal bones rather distinctly marked. Facial portion of medium length; orbits much produced in a forward direction, leaving but a small space between them and the roots of the canines; zygomatic arches a good deal expanded. Palate short, nearly as broad in front as behind. Lower jaw short and light, with a moderate degree of curvature. All the front teeth short and small.

N. Geoffroyi.—General form of the skull differing from that of all the others. It is rather long, narrow, and depressed, with a total absence of ridges or crests, and the occipital region rounds-off posteriorly without any angularity. It is thin and somewhat diaphanous; facial depression narrow, deep in the centre, not clearly defined anteriorly, and passing further back than in the other species, its posterior portion being indicated by two thread-like lines which converge to an acute point on the fore part of the central region. Facial portion of medium length, and narrowed anteriorly; zygomatic arches but very little expanded. Palate much narrower in front than behind. Lower jaw slender, with the lower outline nearly straight. Front teeth proportionally long and rather strong.

The crania of these species present the following dimensions:—

	<i>N. Timoriensis.</i> in. lines.	<i>N. Gouldi.</i> in. lines.	<i>N. unicolor.</i> in. lines.	<i>N. Geoffroyi.</i> in. lines.
Length from the condyloid fossa to the anterior margin of the maxillary bone	0 6	0 5½	0 4½	0 4½
Length from the hinder margin of the parietal bones to the anterior margin of the maxillary bone ...	0 7	0 6¾	0 6	0 5¾
Breadth across zygomatic arches...	0 6	0 5	0 5	0 4½
Greatest breadth of the cerebral region.....	0 4	0 3¾	0 4	0 3¾
Greatest breadth of the facial depression	0 2½	0 2	0 2	0 1¾
Length of the bony palate	0 4	0 3	0 2½
Length of the series of teeth of the upper jaw, exclusive of the incisors	0 3½	0 3	0 2¾	0 2½
Space between the points of the upper canines.....	0 2½	0 2	0 2	0 1¾
Space between the posterior molars	0 2¾	0 2½	0 2¼	0 2
Greatest length of the lower jaw...	0 6½	0 5¾	0 5	0 5
Breadth of the lower jaw, taken in a vertical direction from the coronoid process	0 2½	0 2¼	0 2	0 1¾
Length of the series of teeth in the lower jaw, exclusive of the incisors	0 3¾	0 3½	0 3	0 3
Space between the points of the lower canines.....	0 1¾	0 1½	0 1½	0 1½

I am especially indebted to Mr. Gould for having placed at my disposal materials which have been of great service in making out the species treated of in the present memoir. The use of specimens collected by him, with the knowledge of their exact localities, has been a great assistance in more respects than one. Besides affording evidences leading to the determination of several species, in a genus formerly supposed to be represented by only one, it has also afforded materials which have tended in some measure to the decision of what constitutes a species and what is only a variety.

It is a well-known fact, that many mammals and birds inhabiting India are found to vary remarkably in size and colour in different parts. Thus if we take some of the Bats as an instance suitable for the present occasion (and we might equally adduce many other mammals and birds) *, we shall find those inhabiting South India and Ceylon smaller and darker in colour than those occurring more northward; and on further examining the matter, we shall further discover that they are referable to the same species, and that intermediate examples may be found at intermediate localities. Not only in external conformation are they similar in their proportions, but also in the details of their osseous system. The skulls of these va-

* Among the Bats may be particularly noticed *Cynopterus marginatus*, *Scotophilus Coromandelicus*, and *Vespertilio papillosus*. See Dr. Kelaart's 'Fauna Zeylanica,' and the appended notes by Mr. Blyth, as also various notices of Mammalia by the latter gentleman in the Journal of the Asiatic Society.

rieties, in which we should expect to find the most constant, and therefore most valuable differences, should any exist, present no variety amongst themselves, excepting that of size; and in this latter respect they bear an exact relation to the varieties to which they belong.

With a series of specimens before me illustrating this, I have exercised the same geographical and anatomical tests to the so-called varieties of the present genus. The results of this attempt were by no means similar to those observed of the Indian species; for instead of meeting with anything like the gradation which occurs there, I have found that the largest and the smallest examples were alike inhabitants of Western Australia; whilst a third, which in point of size would have served to unite the two, was separated from them by a wide interval, occurring on the coast of New South Wales. This led to a re-examination of the specimens, and more especially to a comparison of their crania. They were found to be very dissimilar.

Here, then, are two instances, one in which the variation is clearly traceable to an external cause, and accompanied by a uniformity of internal structure, thereby corroborating the unity of the species; and another, in which the variation is not due to any apparent cause, and not only unsupported by anatomical similarity, but the unity of the species absolutely disproved by the existence of very diverse osteological characters.

Without dwelling longer on this subject, I may observe, that these remarks have arisen, in the first place, from the consideration of some exceedingly judicious observations on the variation of species, delivered at the Meeting of the British Association at Cheltenham in 1856, by the Rev. Leonard Jenyns. I must refer the reader to the communication printed entire in the Report of the Proceedings of the Association for that year, and content myself with observing that that gentleman urged the necessity of duly considering the influence of climatal and other causes in producing varieties of species; and also pointed out, that, in the absence of any such causes, any considerable amount of difference from a known species might be regarded as strong distinctive evidence.

Since the preceding account was written, I have obtained another specimen of *Nyctophilus Timoriensis*, collected in some part of Australia, but I do not know the exact locality.

As it is preserved in spirit, and in good condition, I am enabled to give a better account of the form of the face and nose-leafs than that already given, and thus add at the same time to the specific and generic characters.

The first nose-leaf is slightly emarginate and rises from immediately above the nostrils, in such a manner as to give the end of the nose somewhat the appearance of a disc, in which the nostrils are pierced. Between them and the nose-leaf, however, is a deepish transverse depression, with two pits, one over each nostril, which in some measure destroys the regular disc-like appearance of the end of the snout. The nostrils themselves are pear-shaped, with the

narrow ends curving outwards and upwards until they come in immediate contact with the base of the nose-leaf, on each side. Laterally, and below, they are encompassed by the thickened prominent part of the lip, so that they are seen to occupy the bottom of a shallow depression, and open perfectly in front. Between them is a narrow thread-like ridge. Between the first and second nose-leaf is a small but deep hollow or pit, and the second nose-leaf rises behind this in the form of a thick fleshy or cartilaginous projection, not deserving the name of "leaf," transverse in direction, but much narrower and less prominent than the true nose-leaf, and thickly covered with short hairs. Above this appears the facial depression before described. The lower lip is without hairs in front, but the naked part is not clearly defined, as it is in many *Vespertilionidae*.

The ears are conspicuously sulcated, and their outer margins extend along the side of the face in a line with the cleft of the mouth, and end at a little more than a line from its angle. The tragus presents some points of difference from that of dried specimens. Near the base of the outer edge are two distinct points, and above them some fine crenulations, which are succeeded by a portion of the margin, which is singularly indented. It appears as if this portion were thickened, and a little produced backward and forward; so that when viewing the front surface of the tragus, this part is seen *edgeways*; and when the edge of the tragus is seen, this part presents a *flat* surface*. Above this space the edge again becomes thin, and is finely crenulated to the tip.

The carpus of the closed wing reaches to the front corner of the eye. The wing-membranes extend precisely to the base of the toes, and the *os calcis* occupies about one-third of the space between the foot and tip of the tail. The latter is composed of eight or nine vertebrae, the small terminal one being disengaged from the membrane. All the claws—of wings and feet—are singularly short and weak.

	in.	lin.
Length of the head and body	2	11
——— of the tail	2	0
——— of the head	0	11
——— of the ears	0	10
——— of the tragus	0	3
——— of the fore-arm	1	9
——— of the longest finger	3	4
——— of the fourth finger	2	6
——— of the thumb	0	4
——— of the foot and claws	0	5
Expanse of wings	13	0

* If a thin sheet of any material of a pasty consistence were taken, and pressure applied to a small portion of its edge, so as to thicken it, and raise a kind of *rim* or *bur*, visible on each side of the sheet, it would represent pretty exactly this peculiarity of the tragus in *Nyctophilus*. I may add, that having my attention directed to it, I have been able to detect the same peculiarity in the dried specimens, but much less distinctly visible.

6. AN ATTEMPT TO DISTRIBUTE THE SPECIES OF OLIVE (*OLIVA*, LAMARCK) INTO NATURAL GROUPS, AND TO DEFINE SOME OF THE SPECIES. BY DR. J. E. GRAY, F.R.S., V.P.Z. & ENT. SOC., ETC.

Linnaeus divided the shell, usually called *Olives* by the dealers, into three species, viz. *Voluta porphyria*, *V. oliva*, and *V. ispidula*.

Gmelin added a few, and Lamarck, who published a monograph of the genus in the 'Annales du Museum,' extended the number to sixty-two. Dillwyn reduced them back to eighteen.

Duclos, who published the plates of a monograph of this genus in 1835, figures eighty-four recent species, and he considers twenty-two of the species which Lamarck described as distinct, as only varieties of other species.

In 1850 Mr. L. Reeve, in the 'Conchologia Iconica,' published the figures of 100 species, but without any attention to their affinity to each other, and with scarcely sufficient care to the more important part of the shell on which the separation of the species depends. They are there inferior to those of M. Duclos.

I believe that it is the uncertainty with regard to the number of the species which has rendered these shells, which are certainly one of the most beautiful in form, colour, and marking that we possess, so little attended to by the general collector. This is the more remarkable, as the shells are very extensively distributed over the globe, and are easily collected, and therefore are easily procured by the conchologist at a moderate rate; though it is very difficult to define the limits of many of the species on account of the great variation in the colour, and the extraordinary manner in which the marking gradually changes in their character; while other species are easily distinguished.

All the species are easily separated into very distinct groups, defined by variations in the form and structure of the shell, which are evidently produced by important modifications in the structure of the animal; and to point out these groups is the object of this paper, for I believe that by dividing the species or varieties, which have been considered as species, into such groups, I shall do much to disentangle the subject, and at least confine the confusion to definite limits; for if the groups are properly defined, it is only the specimens belonging to one of these groups that can be varieties of each other.

M. Duclos, in the monograph, divides the species into four groups:—1. *Ancilloides* (twenty-nine species); 2. *Cylindroides* (fifty species); 3. *Glandiformes* (seventeen species); 4. *Volutelles* (seventeen species).

M. D'Orbigny, in his 'Voyage to South America,' formed M. Duclos's four sections into three genera, giving to the first section the name of *Olivina*, to the second and third section that of *Oliva*, and to the fourth *Olivancillaria*, apparently founded on the form of the animal; but it is only necessary to compare his figures of the animal of the two species of the latter genus to show how little he attended to his own characters.

In the 'Zoology to Capt. Beechey's Voyage' I divided the genus into two, according to the structure of the animal, viz. *Oliva* and *Agaronia*, and observed that some *Olivæ* were furnished with an operculum not present in other species. More lately in the text to Mrs. Gray's 'Figures of Molluscous Animals,' and in the 'Guide to the Collection of Mollusca' in the Museum, I have extended the number of genera to four; separating the operculated *Olivæ* under the name of *Olivella*, and giving to an animal figured by D'Orbigny as *Oliva auricularia* the name of *Scaphura*.

These shells sometimes have an elevated shelly cross band. Lamarck had a specimen of *Oliva porphyria* (Hist. viii. 418) so marked. It is not uncommon in *O. guttata*, where it has been regarded as a species; but it is often found in other species.

A further study of the figures of the animals given by authors has induced me to revise this arrangement and propose the following

SYNOPSIS OF THE GENERA.

1. *Head exposed; tentacles elongate, subulate; eyes distinct, sub-basal. The foot elongate, dilated, front lobe semicircular; opercula none. Shell with the front belt narrow.*

* *Spire simple, with sutural groove open to the top.*

1. STREPHONA.

Pillar lip simple, not covering the front belt; inner lip cross-grooved.

2. ISPIDULA.

Pillar lip simple, not covering the front belt; inner lip thickened, the whole length with two or three slight grooves in front.

3. RAMOLA.

Pillar lip simple, not covering the front belt; inner lip with a series of transverse parallel grooves in front extending over the pillar.

4. CARMIONE.

Pillar lip expanded so far back as to cover the front belt, and with an oblique raised ridge in front; inner lip grooved.

** *Spire callous, obliterating the sutural grooves, except on the last whorl.*

5. CLANEOPHILA.

Shell ovate or obconic; aperture wide. Pillar lip expanded. Pillar twisted and grooved in front. Front belt broad.

6. GALEOLA.

Shell subcylindrical; spire small; aperture linear. Pillar lip simple, defined; inner lip grooved. Front belt narrow.

II. *Head scarcely exposed; tentacle short; eyes none; foot elongate, dilated in front (one-coloured). Shell, sutural groove open.*

7. ANAZOLA.

Shell subcylindrical or subovate; aperture oblong, thickened; front belt broad, double.

8. AGARONIA.

Shell subovate; aperture ovate; pillar slightly thickened; front belt single, moderate.

III. *Head hidden; tentacles none; eyes none; foot short, very broad, rounded on the sides, one-coloured; opercula distinct.*

9. OLIVINA.

Spire conical; sutural groove open to the apex; aperture of shell moderate; operculum distinct; foot very short, front lobes linear.

10. SCAPHULA.

Spire conical; sutural groove open to the apex; aperture of shell wide; pillar lip thick, smooth, with two grooves in front; operculum none?; foot large, front lobes very large, rounded.

11. MICANA.

Spire callous; sutural groove only open on the last whorls; aperture moderate; operculum distinct.

1. STREPHONA.

Shell subcylindrical; spire conical or flattish, small; aperture linear; pillar lip simple, only expanded in front, and not covering the callus; front belt narrow; inner lip cross-grooved. Foot elongate, longer than the shell, broad, rounded behind, dilated on the sides, which are bent up and cover the shell, the front lobes nearly semicircular, rather produced and acute at the hinder outer angles. Head exposed; tentacles elongate; eyes one-third from the base; operculum none.

Adanson, in his 'Hist. Nat. du Sénégal,' regards all the specimens of this genus as belonging to one species, observing:—"La couleur de cette coquille est peu constante. J'en ai de blanches, de jaunes, de jaunes livids, de jaunes verd, &c., même de verdâtres sans aucun mélange. J'en ai aussi qui, sur ces différens fonds, sont taches, tigrées, marbrées ou couvertes de zigzags, qui s'étendent tantôt sur leur longueur, tantôt sur leur largeur. Ces taches, ces points, ces bandes, et ces lignes sont cendres, noir ou bleuâtre dans les unes, brun, rougeâtres ou pourpres dans les autres: enfin leur mélange est si varié, que ce seroit perdre son tems que de faire l'énumération de toutes celles qui ont été décrites ou figurées par leurs auteurs. Je

me suis contente de citer une vingtaine des principales variétés auxquelles on peut rapporter tous les autres, dont plus de deux cens sont parvenues à ma connoissance. Leur intérieur est aussi blanc, jaune, violet, ou pourpre foncé.”—p. 65.

It would appear either that the animals vary as much in colour as the shells, or, if permanent, they present good character for the separation of the species, according to the specimens of the animal figured by Messrs. Quoy and Gaimard in the ‘Voyage of the Astrolabe,’ t. 46, which are copied and improved (?) by M. Duclos. The animal of the black variety of *O. naura* is black, minutely brown-dotted, and with a regular pale edge to the foot. *S. erythrostoma* and *S. Textilina* is pale brown, with large brown spots. *S. elegans* and *S. sanguinolenta* are yellow, minutely black-dotted; it is interesting to observe that the shells, which are allied in colour and form, also have animals similarly allied.

1. STREPHONA PORPHYRIA.

Reddish-brown, spotted with angular reddish lines; spire and front of pillar violet, spire conical.

Voluta Porphyria, Linn. S. N. ii. 87.

Oliva Porphyria, Lamk. no. 1; E. M. t. 351. f. 4; Duclos, Oliv. t. 24. f. 15; Reeve, C. I. t. 1. f. 2.

Hab. Panama.

2. ST. ANGULATA.

Throat and pillar reddish.

Voluta incrassata, Soland. MSS.; Dillw. R. S. 516.

Oliva angulata, Lamk. no. 6; E. M. t. 363. f. 16; Duclos, Oliv. t. 17. f. 9, 10; Reeve, C. I. t. 1. f. 1.

Oliva azemula, Duclos, *vide* Reeve.

Hab. Gulf of Nicolya.

3. ST. CRUENTA.

Throat orange.

Oliva guttata, Lamk. n. 14; Dillw. 32.

Oliva maculata, Duclos, Oliv. t. 15. f. 1-6; Reeve, C. I. t. 14. f. 30.

Voluta cruenta, Solander, MSS.; Dillw. R. S. 514.

Voluta ispidula, Martini, ii. f. 491, 492.

Oliva Mantichora, Duclos, Oliv. t. 15. f. 7, 8.

Var. subangular, with a raised rib behind.

Voluta amulata, Gmelin, S. N. 3441; Dillw. R. S. 515.

Voluta balleata, Soland. MSS.

Oliva leucophaea, Lamk. n. 14; E. M. t. 363. f. 2.

Hab. Isle of France.

4. ST. MAURA.

Black, yellow or grey; throat and pillar lip white.

Oliva maura, Lamk. n. 7; E. M. t. 366. f. 1, 2; 365, f. 1, 3; Duclos, Oliv. t. 23. f. 1-12; Reeve, t. 7. f. 10.

Oliva sepulchralis, Lamk. n. 7; E. M. t. 365. f. 1.

Voluta Oliva, F, H, L, K, O, P, Q, S; Dillw. R. S. 512.

Cylindrus Nigellus, Menschen.

Oliva fulminans, Lamk. n. 9; E. M. t. 364. f. 4.

Oliva funebris, Lamk. n. 26; Martini, f. 480, 481.

Animal dark brown, minutely black-dotted, with a pale edge to the foot. See Voy. Astrol. t. 46. f. 20; Duclos, t. 30.

5. ST. TRICOLOR.

White, black, and yellow; front (and sometimes all the inner lip) yellow brown.

Oliva tricolor, Lamk. no. 22; E.M. t. 365. f. 4; Duclos, Oliv. t. 20. f. 9-13; Reeve, C. I. t. 12. f. 22.

O. sanguinolenta, Lamk. no. 23; Duclos, Oliv. t. 20. f. 14-16; Reeve, C. I. t. 13, f. 25.

Voluta Oliva, C. & F. Dillw. R. S. 512.

Oliva zebra, Kuster, C. C. t. 5. f. 5, 6.

Oliva Philantha, Duclos, Oliv. t. 20. f. 5, 6.

Oliva evania, Duclos, Oliv. t. 20. f. 3, 4.

Oliva elegans, Lamk. no. 11; E. M. t. 367. f. 3, t. 362. f. 3; Duclos, Oliv. t. 21. f. 1-6; Reeve, C. I. t. 12. f. 20.

Oliva glandiformis, Lamk. no. 27.

Oliva tigrina, Lamk. no. 44; Duclos, Oliv. t. 21. f. 7-12, t. 32. f. 1, 2; Reeve, C. I. t. 12. f. 21.

Oliva Macleaya, Duclos, Oliv. t. 21. f. 13-16.

Hab. Fejee Islands, Madagascar.

Animal yellow, minutely black-dotted (Voy. Astrol. t. 46. f. 2-6; Duclos, t. 31).

6. ST. EPISCOPALIS.

Throat purple.

Oliva episcopalis, Lamk. no. 12; Lest. t. 719. f. 3; Duclos, t. 10. f. 11, 12; Reeve, C. I. t. 13. f. 24.

Voluta oliva, D. Dillw. R. S. 512.

7. ST. ERYTHROSTOMA.

Throat saffron colour.

Oliva erythrostoma, Lamk. no. 3; E. M. t. 361. f. 3; Duclos, Oliv. t. 13. f. 1-7; Reeve, C. I. t. 5. f. 7.

Cylindrus erythrostoma, Menschen.

Voluta erythrostoma, Dillw. R. S. 511.

Oliva ponderosa, Duclos, Oliv. t. 13. f. 8, 9; Reeve, C. I. t. 2. f. 4.

Oliva tremulina, Lamk. no. 5; Duclos, Oliv. t. 11. f. 1-9; Reeve, C. I. t. 4. f. 6.

Oliva Olympiadina, Duclos, Oliv. t. 12. f. 10, 11, 12; Reeve, C. I. t. 3. f. 5.

Oliva azemula, Duclos, Oliv. t. 14. f. 1, 2, 3.

Hab. Mauritius and Philippines.

Animal reddish, with large brown spots (Voy. Astrol. t. 46. f. 1; Duclos, t. 31).

8. ST. TEXTILINA.

Mouth white.

Oliva obtusaria, Lamk. no. 53.

Oliva textilina, Lamk. no. 2; E. M. t. 362. f. 5; Duclos, Oliv. t. 14. f. 2-9; Reeve, t. 6. f. 9.

Oliva Pica, Lamk. no. 4.

Oliva zeilanica, Lamk. no. 54.

Oliva hepatica, Lamk. no. 35.

V. oliva, var. A., Dillw. R. S. 511.

Voluta erythrostoma, var., Dillw. R. S. 511.

Oliva granitella, Lamk. no. 18.

Oliva nobilis, Reeve, C. I. t. 2. f. 3, mouth pale reddish.

Oliva irisans, part, Reeve, C. I. t. 6. f. 8, *b, c, d.* (not *e*).

Hab. Mauritius.

Animal reddish, with large brown spots (Voy. Astrol. t. 46. f. 7 *a*).

9. ST. SCRIPTA.

Oliva scripta, Lamk. n. 21; E. M. t. 362. f. 4; Duclos, Oliv. t. 10. f. 13, 14; t. 30. f. 5, 6, animal; Reeve, C. I. t. 14. f. 27.

Oliva mustelina, Lamk. n. 24; Duclos, Oliv. t. 20. f. 1, 2; Reeve, C. I. t. 13. f. 23.

10. ST. LITTERATA.

Oliva litterata, Lamk. n. 20; E. M. t. 362. f. 1; Duclos, Oliv. t. 10. f. 15, 16; Reeve, C. I. t. 11. f. 18.

Hab. West Indies.

Animal grey.

11. ST. PERUVIANA.

Oliva senegalensis, Lamk. n. 29; E. M. t. 364. f. 3.

Oliva Peruviana, Lamk. n. 28; E. M. t. 367. f. 4; Duclos, Oliv. t. 15. f. 9-16; Reeve, C. I. t. 9. f. 14.

Var. Back of whorl more or less angular.

Hab. Peru; Central America.

12. ST. RETICULARIS.

Mouth white; suture with groups of radiating lines.

Oliva fusiformis, Lamk. no. 20; E. M. t. 367. f. 1; Duclos, Oliv. t. 16. f. 12-16; Reeve, C. I. t. 8. f. 11.

- O. vermiculata*, Lamk.
O. araneosa, Lamk. no. 19; E. M. t. 363. f. 1.
O. reticularis, Lamk. no. 16; E. M. t. 361. f. 1; Duclos, Oliv.
t. 9. f. 3-12; Reeve, C. I. t. 10. f. 16.
O. hepatica, Lamk. no. 35, 36.
O. Timoria, Duclos, Oliv. t. 17. f. 11-13.
O. alba, Lamk. no. 42; E. M. t. 368. f. 4.
O. harpularia, Lamk. no. 34; Chemn. x. f. 1376. 77; Reeve, C.
I. t. 14. f. 28 (worn).
O. ustulata, Lamk. no. 36.
O. venulata, Lamk. no. 13; E. M. t. 361. f. 5; Duclos, t. 16.
f. 5, 6.
O. obesina, Duclos, t. 16. f. 9, 10.
O. pindarina, Duclos, t. 16. f. 7, 8.
O. Julieta, Duclos, t. 16. f. 3, 4; Reeve, C. I. t. 9. f. 15.

The following twenty-three species (?) are more or less allied to the last.

13. ST. POLPASTA.

- Oliva polpasta*, Duclos, Oliv. t. 16. f. 1, 2; Reeve, C. I. t. 14. f. 29.

14. ST. STAINFORTHII.

- Oliva Stainforthii*, Reeve, C. I. t. 19. f. 40.

15. ST. PINTAMELLA.

- Oliva Pintamella*, Duclos, Oliv. t. 33. f. 7, 8.

16. ST. ATALINA.

- Oliva atalina*, Duclos, Oliv. t. 9. f. 9, 10.

17. ST. QUERSOLINA.

- Oliva Quersolina*, Duclos, Oliv. t. 9. f. 7, 8.

18. ST. NITIDULA.

- Oliva nitidula*, Duclos, Oliv. t. 9. f. 3, 4.

19. ST. ORIOLA.

- Oliva oriola*, Lamk. no. 41; E. M. t. 366. f. 3; t. 367. f. 2; Duclos, t. 10. f. 1, 2.
Voluta oliva, V. Dillwyn, R. S. 513.

20. ST. PAXILLUS.

- Oliva paxillus*, Reeve, C. I. t. 21. f. 56.

21. ST. SPLENDIDULA.

- Oliva splendidula*, Sow. Tank. Cat. App. 32; Duclos, t. 9. f. 1, 2; Reeve, C. I. t. 11. f. 17.
Hab. Panama.

22. ST. TIGRIDELLA.

Oliva Tigridella, Duclos, Oliv. t. 8. f. 13-16.

23. ST. STELLATA.

Oliva stellata, Duclos, Oliv. t. 8. f. 11, 12.

24. ST. LENTIGINOSA.

Oliva lentiginosa, Reeve, C. I. t. 19. f. 45.

25. ST. JASPIDEA.

Oliva Jaspidea, Duclos, Oliv. t. 8. f. 9, 10.

O. Duclosii, Reeve, C. I. t. 19. f. 44.

Hab. Philippines.

26. ST. KALEONTINA.

Oliva kaleontina, Duclos, Oliv. t. 8. f. 7, 8; Reeve, C. I. t. 20. f. 49.

Hab. Gallapagos.

27. ST. TRINGA.

Oliva Tringa, Duclos, Oliv. t. 8. f. 5, 6.

28. ST. AUSTRALIS.

Oliva australis, Duclos, Oliv. t. 8. f. 3, 4; Reeve, C. I. t. 19. f. 42.

Hab. Swan River (*Cab. Gray*).

29. ST. ANOMINA.

Oliva anomina, Duclos, Oliv. t. 8. f. 1, 2.

30. ST. CUMINGII.

Oliva Cumingii, Reeve, C. I. t. 11. f. 19.

Hab. California.

31. ST. FLAMMULATA.

Oliva flammulata, Lamk. no. 17; E. M. t. 367. f. 5; Duclos, t. 8. f. 17-20; t. 30. f. 3, 4, animal (not Reeve, C. I. t. 19. f. 41).

Fol. ispidula, var., *Borm.*

F. oliva, T. Dillw. R. S. 513.

Hab. — ?

32. ST. OLORINELLA.

White.

Oliva olorinella, Duclos, Oliv. t. 6. f. 15, 16.

33. ST. FLAVEOLA.

Oliva flaveola, Duclos, Oliv. t. 6. f. 17-20.

34. ST. LIGNEOLA.

Oliva ligneola, Reeve, C. I. t. 21. f. 57.

Hab. — ?

35. ST. SCHUMACHERIANA.

Front of pillar lip brown.

Oliva Schumacheriana, Beck.

Hab. California.

36. ST. RUFULA.

Spire very short.

Oliva rufula, Duclos, Oliv. t. 19. f. 9, 10; Reeve, C. I. t. 20. f. 50.

37. ST. NEOSLINA.

Oliva Neoslina, Duclos, Oliv. t. 19. f. 11-16.

38. ST. SIDELIA.

Oliva sidelia, Duclos, Oliv. t. 19. f. 1, 2.

39. ST. CAROLINIANA.

Oliva caroliniana, Duclos, Oliv. t. 19. f. 3-8.

O. bubiformis, var., Reeve.

40. ST. HEMILTONA.

Oliva Hemiltona, Duclos, Oliv. t. 19. f. 3, 4.

41. ST. MULTIPLICATA.

Oliva multiplicata, Reeve, C. I. t. 20. f. 52.

42. ST. LUGUBRIS.

Oliva lugubris, Lamk. no. 25; Duclos, Oliv. t. 10. f. 5, 6.

2. ISPIDULA.

Shell cylindrical; spire conical, sutural groove open to the top; aperture linear; pillar lip simple, only dilated in front, not covering the front belt; inner lip thickened the whole length, with two or three oblique grooves in front.

Foot elongate, longer than the shell, acute behind, not dilated on the sides in front, not or only slightly covering the shell, front lobes moderate, broad, produced and acute at the sides; tentacles elongated, exposed; eyes one-third from the base; operculum none. — *Duclos*, t. 7. f. 2.

1. *ISPIDULA VARIABILIS*

Throat brown; inner lip thickened with two or three deep grooves in front.

Oliva ispidula, Lamk. no. 40; E. M. t. 366. f. 6; Reeve, t. 17. f. 34; Duclos, Oliv. t. 7. f. 1-14, animal.

O. candida, Lamk. no. 42; E. M. t. 360. f. 4.

Voluta oliva, R. S. Dillw. R. S.

3. *RAMOLA*.

Shell subcylindrical; spire small, conical, sutural groove open to the tip; aperture narrow; anterior belt narrow, single. Pillar lip expanded in front, not covering the front belt, with numerous equal transverse grooves in front. Operculum none. "Foot large, covering the shell."—*Adams*.

1. *RAMOLA VOLUTELLA*.

Oliva volutella, Lamk. no. 43; Duclos, Oliv. t. 6. f. 7-14; Reeve, C. I. t. 21. f. 54.

Oliva cærulea, Gray in Wood, Supp. t. 6. f. 36.

Olivella volutella, Gray, Guide Moll. B.M. 24; Fig. Moll. t. 83 a. f. 2.

Oliva Razamola, Duclos, Oliv. t. 6. f. 5, 6.

Hab. West Coast of America.

4. *CARMIONE*.

Shell ovate, subcylindrical; spire small, sutural groove open to the tip; aperture linear, narrow. Pillar lip expanded, sufficiently far back as to cover the front callous belt, and furnished with a more or less distinct raised cross ridge; inner lip grooved.

1. *CARMIONE VENTRICOSA*.

Voluta ventricosa, Soland. MSS.; Dillw. R. S. 514.

Oliva inflata, Lamk. no. 32; E. M. t. 364. f. 5; Duclos, Oliv. t. 22. f. 1-16; Reeve, C. I. t. 15. f. 31.

O. fabigina, Lamk. n. 52; E. M. t. 363. f. 5.

O. bicincta, Lamk. no. 33; E. M. t. 364. f. 1.

O. undata, Lamk. no. 31; E. M. t. 364. f. 7.

Oliva bicingulata, Lamk. Ann. E. M. t. 364. f. 1.

O. tigrina, Lamk.

O. bulbiformis, Duclos, t. 27. f. 10-12; Reeve, C. I. t. 13. f. 26.

Hab. Moluccas.

5. *CLANEOPHILA*.

Shell ventricose or obconic; spire callous, the sutural groove closed on all, except the last whorl; aperture ample. Pillar lip expanded, swollen and callous behind, twisted and obliquely grooved

in front. Foot elongate, about as long as the shell, broad, rather tapering behind, dilated in front, and covering the greater part of the shell, front lobes rather large, crescent-shaped, outer hinder angles acute. Tentacles elongate; eyes one-third from the base. Operculum none.—*Duclos*, t. 33. f. 6.

* *Shell obconic; front belt rather narrow. Spire broad, depressed.*

1. CLANEOPHILA BRASILIANA.

Oliva Brasiliana, Lamk. Ann.; *Duclos*, Oliv. t. 29. f. 1, 3; t. 33. f. 5, 6, animal; *Reeve*, C. I. t. 8. f. 13.

Voluta pinguis, Soland. MSS.; *Dillw.* R. S. 516.

Oliva Brasiliensis, Chemn. x. f. 1367, 68; *Lamk.* Hist. no. 45.
Hab. Brazils.

** *Shell ovate; front belt broad. Spire small, very callous.*

2. CLANEOPHILA AURICULARIA.

Shell ovate. Pillar lip slightly expanded, moderate.

Oliva auricularia, Lamk.; *Duclos*, t. 29. f. 47.

O. aquatilis, *Reeve*, C. I. t. 18. f. 37.

Olivancillaria auricularia, D'Orb. Voy. Amér. MÉR. 421. t. 59. f. 20, 22, shell cop.; *Duclos*, Oliv. t. 32. f. 1, 2.

Oliva patula, *Sow.* Tank. Cat. 33.

Hab. S. America.

3. CLANEOPHILA GIBBOSA.

Shell ventricose, subangular. Mouth very wide. Pillar with a large tubercular callus in front.

Oliva claneophila, *Duclos*, Oliv. t. 29. f. 89.

O. auricularia, *Reeve*, C. I. t. 18. f. 39.

Hab. West Africa. Not Brazil, as said by Mr. *Reeve*.

6. GALEOLA.

Shell subcylindrical; spire small, acute, callous, sutural groove of upper whorl is obliterated; aperture linear. Pillar lip defined, expanded in front, not covering the front belt; inner lip thickened, cross-grooved; front belt narrow. Operculum —? Animal —?

Lamarck observed the form of the spire in *O. tessellata* (*Hist.* vii. 430, 433).

* *Spire conical, acute.*

1. GALEOLA IRISANS.

Spire conical, acute. Brown or yellow or greyish, uniform, or with angular marks and two interrupted bands; throat and pillar white.

Oliva irisans, Lamk. no. 10; Duclos, Oliv. t. 28. f. 7, 8, 9, 10, 11, 12.

Voluta oliva, B, Dillw. R. S. 512.

2. GALEOLA CARNEOLA.

Orange; tip of spire white.

Voluta carneolus, Gmelin.

V. carneola, Dillw. R. S. 520.

V. aurora, Soland. MSS.

Oliva carneola, Lamk. no. 39; E. M. t. 365. f. 5; Duclos, Oliv. t. 26. f. 3-16; Reeve, C. I. t. 22. f. 60.

O. Athenia, Duclos, Oliv. t. 26. f. 17-20.

O. todosina, Duclos, Oliv. t. 25. f. 9, 10.

Oliva Calosoma, Duclos, Oliv. t. 26. f. 1, 2.

Var. 1. Brown, with pale angular spots, or pale brown, with darker angular lines.

Var. 2. Subcentral angular belt.

3. GALEOLA TIGRINA.

Yellow, dark-spotted; throat and tip of spire purple.

Cylindrus tigrinus, Menschen.

Voluta tigrina, Dillw. R. S. 520; Duclos, Oliv. t. 27. f. 1-4; Reeve, C. I. t. 20. f. 53.

Oliva tessellata, Lamk. no. 38; E. M. t. 368. f. 1.

Voluta maculata, Soland. MSS.

V. Ispidula, var., Gmelin.

V. oliva, var., Born.

Hab. Philippines.

4. GALEOLA DACTYOLA.

Oliva dactyliola, Duclos, Oliv. t. 27. f. 3-9.

O. bulbiformis, Duclos, Oliv. t. 27. f. 10-13; Reeve, C. I. t. 13. f. 26.

O. leucostoma, Duclos, Oliv. t. 27. f. 14-16.

** *Spire depressed.*

5. GALEOLA AVELLANA.

Spire short, blunt; throat white.

Oliva avellana, Lamk. no. 37; Duclos, Oliv. t. 28. f. 1, 3.

O. Galeola, Duclos, Oliv. t. 28. f. 4-6.

O. irisans, Reeve, C. I. t. 6. f. 8 a (only, not b, c, d).

6. GALEOLA LEPIDA.

Oliva lepida, Duclos, Oliv. t. 25. f. 15-20.